FOUNDRY
EST. 1902 TRADE JOURNAL
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THE FACTS

Everybody knows that one company's products are very much like another's
BUT THIS IS HOW SERFCO PACKETTED AND BRIQUETTED ALLOYS DIFFER FROM ALL OTHER COMPARABLE PRODUCTS

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All through the range, you'll find substantial cash savings if you specify Serfco. Special prices negotiated for tonnage contracts. Write for our leaflet giving full details.

The Darwen After Sales technical Service operates independently of our production organisation. It is unsurpassed in the industry for speed, efficiency and above all objectivity.

SERFCO

Cupobrix Briquetted Alloys · Ladlepax Packetted Alloys

Did you know that the 3½ lb silicon Briquette costs less than the 5 lb briquette yet adds exactly the same amount of Silicon?

Issued in the interests of better foundry practice by

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PECO QUIZ for go-ahead die-casters

Can you name the ten best ways to raise die-casting profits? You've seen them featured in PECO advertisements in previous issues of this magazine. They're vitally important to every profit-conscious die-caster.

It will benefit you to study this unique series of PECO advertisements in detail. Write or phone for a copy of PECO "World Standard" Specifications.

For ten best ways to raise die-casting profits, reverse this page.

1. Introducing Pete 2. Keeping you running 3. Top Die-Casters 4. Bigger projects 5. Stroke of genius 6. Instant squeeze 7. Automatic re-circulation 8. Drawing from experience 9. Peco Point of Control 10. Quick off the mark

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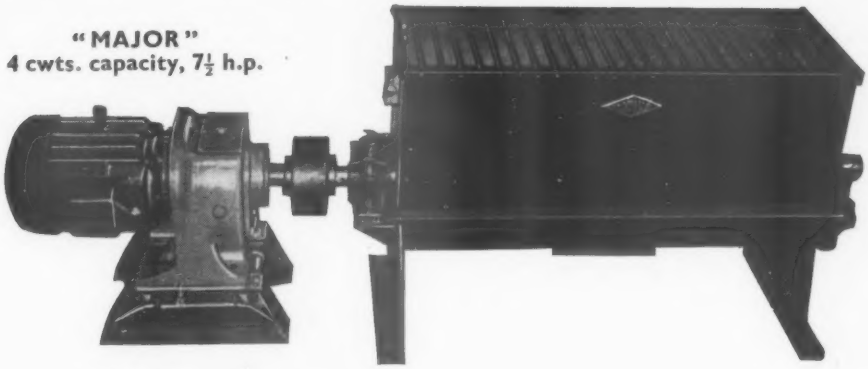
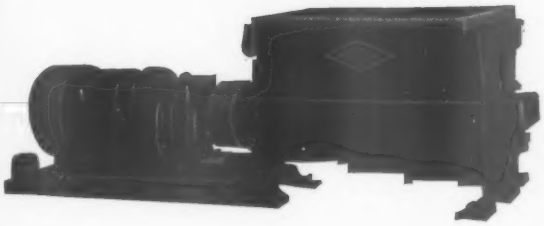
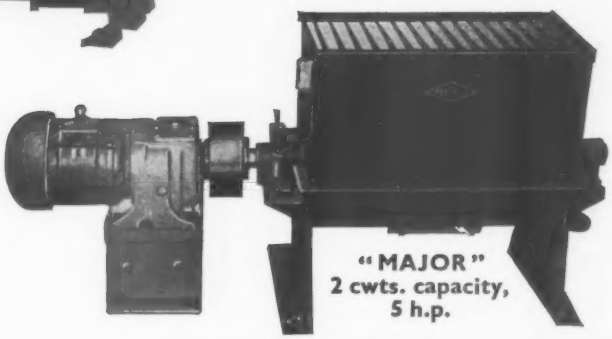
SAND MIXING MACHINES

"MAJOR"
4 cwts. capacity, 7½ h.p.





"MINOR"
50 lbs. capacity, 1 h.p.



"MAJOR"
2 cwts. capacity,
5 h.p.

★ *Rapid intensive mixing.*
★ *Fixed safety locking device.*
★ *Also supplied with belt drive.*
★ *Any voltage supplied.*
★ *Mixing time, 2-4 minutes each batch.*
★ *Low upkeep costs.*

Spermolin
(REGISTERED TRADE MARK)

Office and Works
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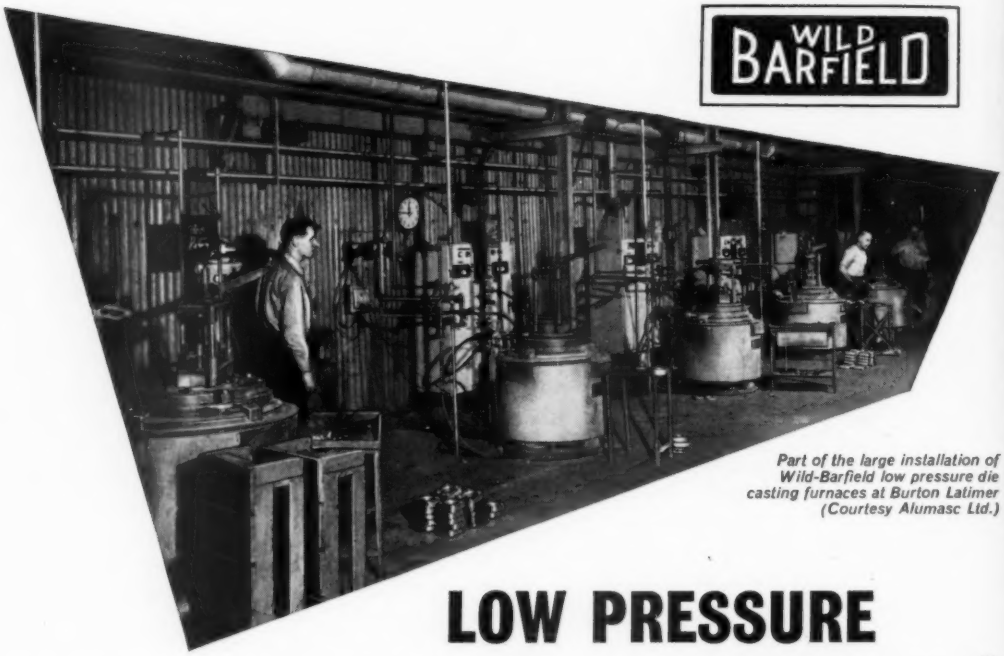
Telephone: 4197

A

WILD BARFIELD



Part of the large installation of Wild-Barfield low pressure die casting furnaces at Burton Latimer (Courtesy Alumasc Ltd.)

LOW PRESSURE ALUMINIUM DIE CASTING FURNACES*

(Mains Frequency Induction Heated)

Simple to service

No elements to burn out

No channels to clean

No metal contamination

Accurate temperature control

Over 30 furnaces supplied to one well-known American Motor Manufacturer and currently used for production of Aluminium engine castings

ELECTRIC WILD BARFIELD FURNACES

FOR ALL HEAT-TREATMENT PURPOSES

**Developed in conjunction with Alumasc Ltd. and specially designed for their low pressure die casting process.*

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WB.III

on the brains trust

"... I'd be hopeless if someone asked me 'Why is water wet?' All the same there would be some questions right up my street. "You can't work at AW for forty years without learning quite a bit about science. Before you know it you're talking about 'Molybdenum influencing austenitic transformation'—a subject that would stop a good many philosophers dead in their tracks.

"There's as much science as there is craft in making Refined Iron these days. I don't know how it is in other firms, but at AW we like to learn something about the other fellow's job—no matter if he's a metallurgist or a foundryman. It leads to better relationships and better products, I can tell you."

REFINED PIG IRON

Supplied to any specification

AW

ARMSTRONG WHITWORTH (METAL INDUSTRIES) LTD

Close Works · Gateshead upon Tyne 8 · Co. Durham · Tel: Gateshead 71261

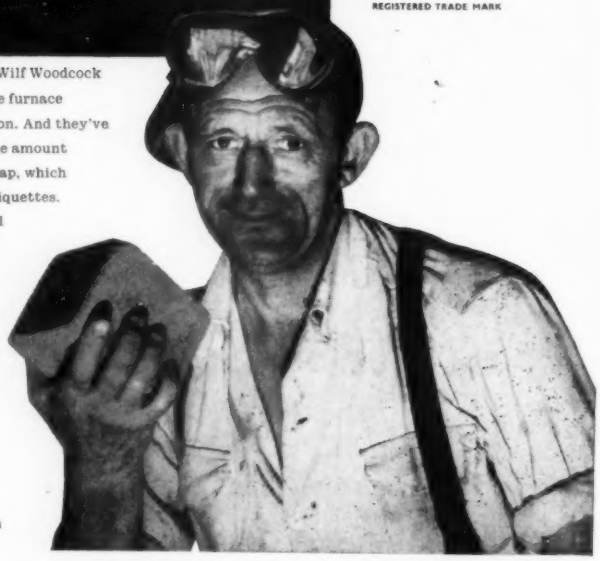
Subsidiary Company: Jarrow Metal Industries Ltd. · Western Road, Co. Durham

CUSTOMERS OF CARBORUNDUM

"These FERROCARBO* briquettes have certainly made a difference" says Wilf Woodcock.

* REGISTERED TRADE MARK

In the foundry at Mather and Platt Ltd., where Wilf Woodcock works, they use FERROCARBO briquettes in the furnace charges, mainly to save on the cost of the pig-iron. And they've been successful—as Wilf says, "We've reduced the amount of pig from 50% to 33%, making up with more scrap, which means that we more than save the cost of the briquettes. And the iron is beautiful. It's clean and has good fluidity—even with poor quality scrap—and they tell me that the machinability has improved, too."



CARBORUNDUM can help you

In most of the major industries of the world, CARBORUNDUM is helping top firms to make better products, to cut costs, and to speed production. In the sharply competitive climate of to-day, there are three main conditions for success: high quality, low prices and early deliveries. CARBORUNDUM can help you meet them all.

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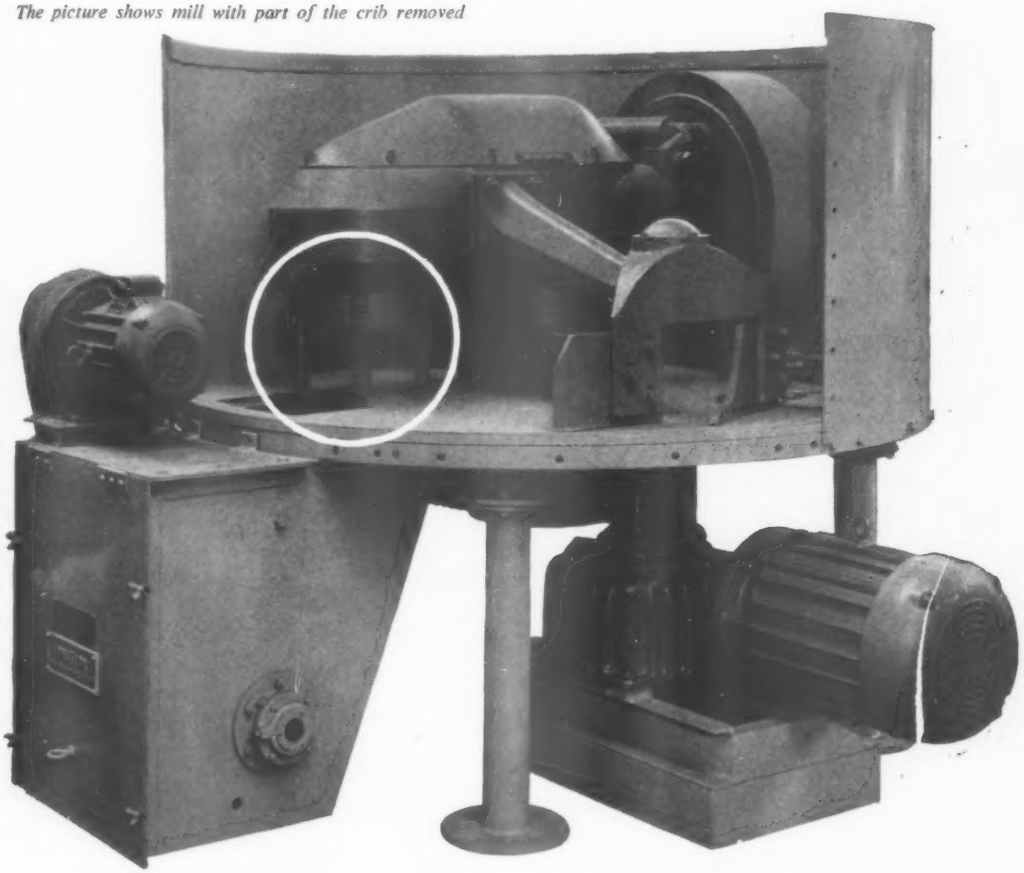
THIS NEW MIXING MILL, WITH THE POSITIVELY DRIVEN STIRRERS, IS ESPECIALLY SUITABLE FOR THE PREPARATION OF CO_2 SAND.

The picture shows mill with part of the crib removed



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PNEULEC LIMITED, 45 GEORGE ROAD, EDGBASTON, BIRMINGHAM 15

FAME for foundry equipment

gas & oil-fired crucible melting furnaces.

gas, electric and oil-fired annealing furnaces & ovens specifically for foundry use.

shell moulding and mould closing machines.

mould driers
sand driers
shell core blowers.

Efco-Diamond rotary reactor for desulphurising iron & steel.

Escher type hot-blast cupola plants.

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die lubricants.

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Weybridge 3891

Associated with Efco Ltd. and Stein & Atkinson Ltd.

News for Rollmakers!

The first pair of electrically heated stoves for drying roll moulds and chills, which were specifically designed for a famous Scottish Roll Foundry, have just completed their first year in production, and have proved to be the answer for which rollmakers everywhere have been looking—to avoid contamination of chills, and prevent porosity in the finished casting.

The elimination of products of combustion which are always present in fuel fired stoves, has removed the possibility of acid precipitation on the chills and ensures perfect rolls every time.

"Off Peak Loading" for overnight drying and the higher efficiency of electric heating provide economical operation, combined with perfect cleanliness.

The use of our self-contained heating units enables the conversion of existing stoves to be carried out expeditiously and with a minimum of interruption to production.

For further particulars write:—

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Specialists in FOUNDRY DRYING EQUIPMENT

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Forest Engineering (PTY) Ltd.,
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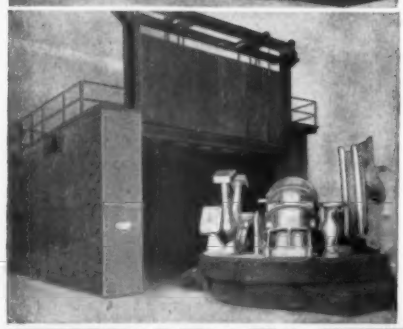
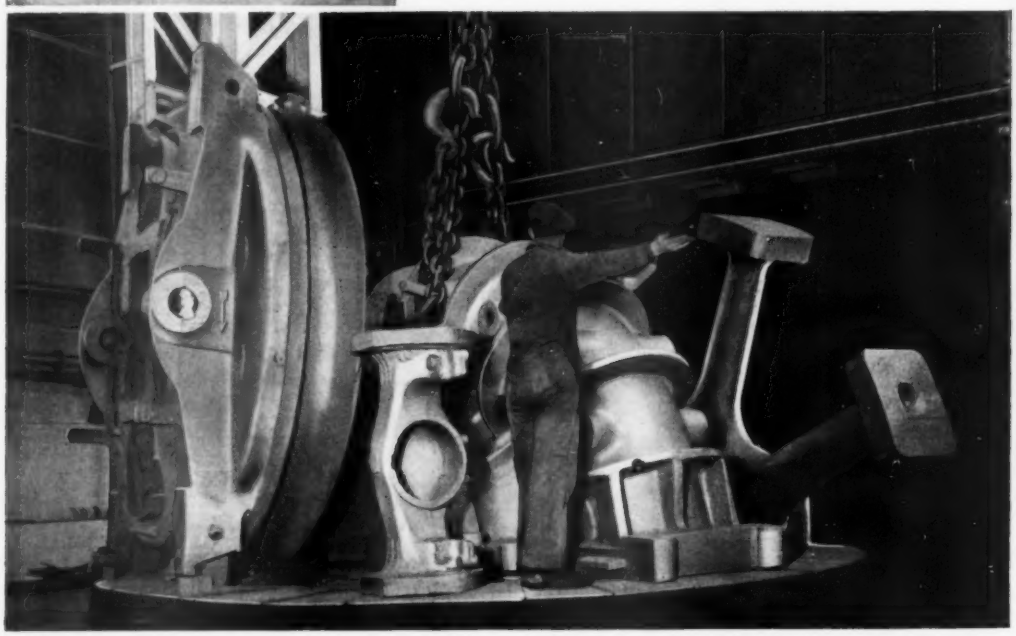


The World's Largest Mechanical

Shot Blast Room Plant

The Tilghman's Wheelabrator Room Plant shown in the accompanying illustrations is 30ft. by 25ft. by 16ft. high, and is installed at Messrs. F. H. Lloyd and Co. Ltd., Wednesbury. This plant, which is fitted with five Wheelabrator units, handles the production from two large bays, the components being loaded on to a bogie equipped with a circular table. Rotating and oscillating motions are provided to the bogie during the cleaning cycle, ensuring maximum blast coverage.



TILGHMAN'S LIMITED BROADHEATH ALTRINCHAM CHESHIRE

LONDON OFFICE: 1 Chester Street, S.W.1. A member of the Staveley Coal and Iron Co. Ltd. Group

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OF GRAPHITE FOR
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An excellent source of graphite for electrothermic, electrochemical, industrial and nuclear applications is now available from the modern graphite plant of Anglo Great Lakes Corporation Ltd, Newcastle upon Tyne.

The graphite is of a uniformly high quality. Many requirements can be shipped from stock. Deliveries are prompt. Prices are competitive.

Let us quote on your requirements. And for an introduction to Anglo Great Lakes Corporation plant, write for a free copy of this recently published brochure . . .

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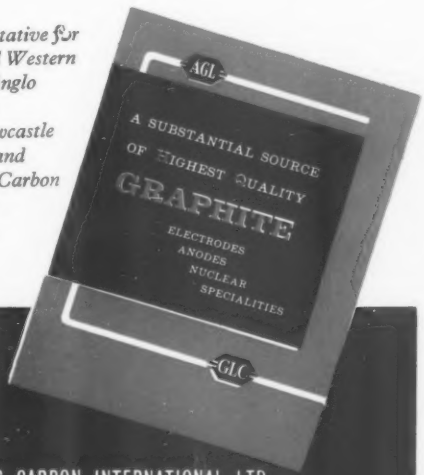

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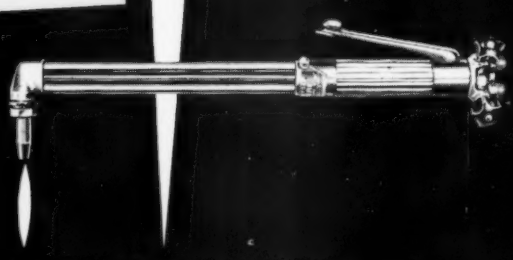

British Oxygen Gases Limited

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EVERY FOUNDRY HAS ITS OWN PROBLEMS

MATERIALS HANDLING?

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HOT METAL RECEIVER?

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The solving of YOUR problem is OUR business.
LET US PUT YOUR SCHEME ON PAPER AND DESIGN, MANUFACTURE AND ERECT THE CORRECT PLANT TO ACHIEVE YOUR PARTICULAR REQUIREMENTS.

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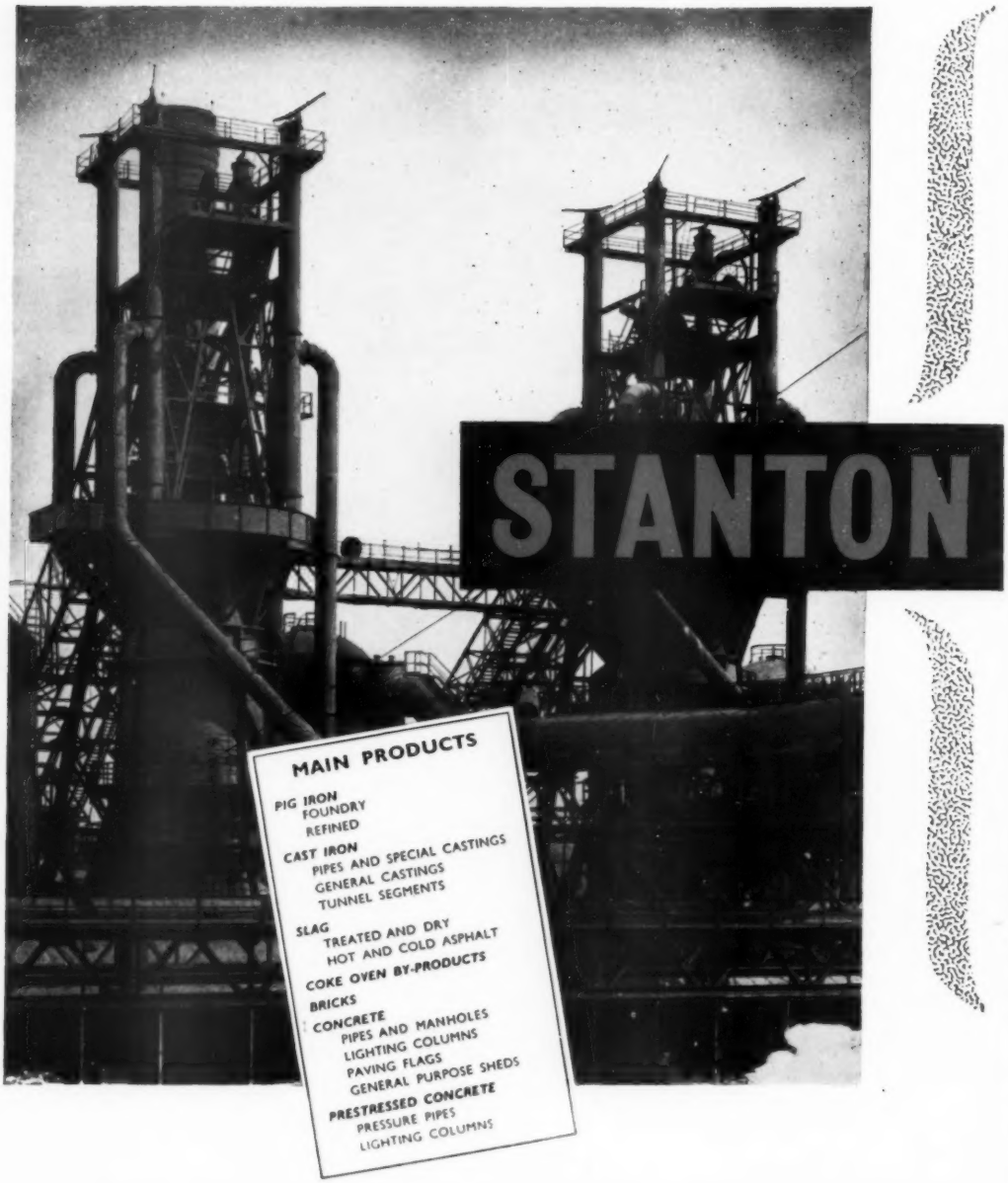
GRAMS: METAQUIP



THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM

STANTON low phosphorus foundry pig iron

This iron is machine cast and customers special requirements can be met within the limits of analysis shown.

It is particularly suitable for the Automobile Industry and for all High Quality Castings.

ANALYSIS		
	Total Carbon	3·4% min.
	Silicon	2·0–4·5% (in ranges of ·5%)
	Manganese	0·7–1·1%
	Sulphur	0·05% max.
	Phosphorus	0·25 % max.

A free and confidential metallurgical service is offered to customers in all aspects of foundry practice and technique.

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

FOXBORO

Foundry Instrumentation

Weigh all the air

THE FOXBORO AIR WEIGHT CONTROL SYSTEM is specially developed to provide the Foundry Industry with Uniform Cupola Control. This completely Automatic System controls the weight of Air delivered to the Cupola, reduces fuel consumption and makes possible :—

UNIFORM HEATING
BETTER POURING
HIGHER QUALITY CASTINGS

In addition, Foxboro Systems are available for measuring, recording or controlling — Pressure, Humidity, Dewpoint, Temperature and many other variables.

FOXBORO-YOXALL LIMITED

REDHILL • SURREY • ENGLAND

Even if a Dust Collector LOOKS like this—

it is not a genuine "STREAMLINE" unless the name in the DIAMOND is

SPENSTEAD

50 YEARS EXPERIENCE

Imitation may be the sincerest form of flattery but it is experience (and we have 50 years of it) that ensures correct application

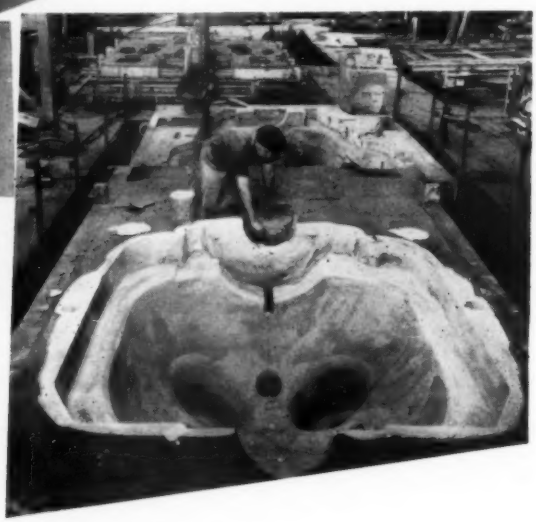
OSSETT YORKSHIRE Tel: 821 Grams: Spenstead

SPENCER & HALSTEAD ltd
OSSETT Yorkshire
• We extract the DUST from InDUSTry •

Powney 516

A NEW SLANT

There could be a new angle to your moulding problems, and as practical foundrymen, backed by a specialised service at Halifax our representatives have most of the answers, where they relate to Core Oils, Cereals, Emulsions, Silicates, Synthetic Resins, Facing Materials, and Air-Set Oils in a comprehensive range.



YOU'VE ONLY TO WM Aske & CO LTD

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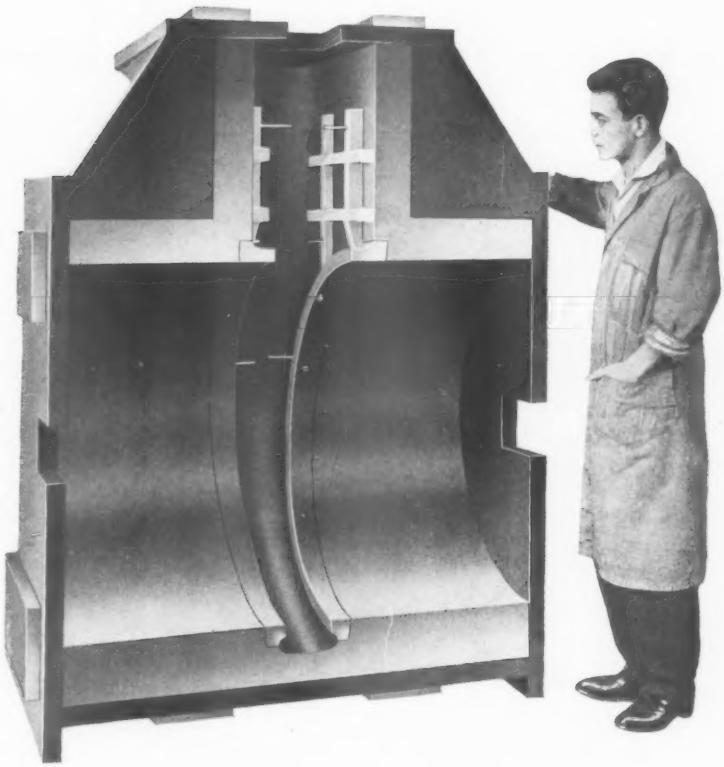


For man-size jobs

Crockett Lowe Ltd of Birmingham made this large corebox of Araldite epoxy casting resin. It provides an exact replica of the original, at a fraction of the cost of a duplicate pattern in wood and in a very short space of time. Araldite hardens at room temperatures without shrinkage, so that no dimensional allowances are necessary. The product is tough, not easily damaged, is unaffected by damp or changes of temperature, and needs no particular care in storage. Furthermore, modifications can be made economically if required, using the same Araldite mixture of resin, hardener and filler.

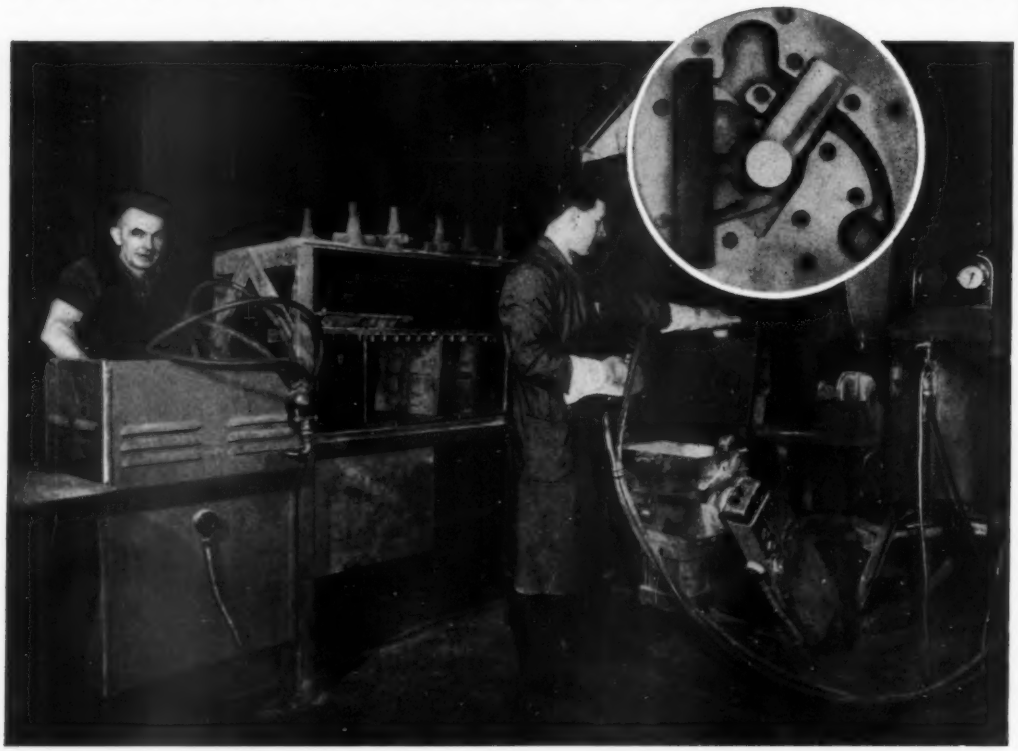
May we send you information on the use of Araldite in foundries?

Araldite **epoxy casting resins**

Araldite is a registered trade name

CIBA (A.R.L.) LTD, Duxford, Cambridge. Telephone: Sawston 2121
AP549

Another Polygram Installation at A.P.V.-Paramount Limited



Photograph of a section of the POLYGRAM Shell Moulding equipment installed at A.P.V.-Paramount Ltd., Crawley, Sussex.

A.P.V.-Paramount Ltd. obtain substantial cost reductions and machining economies Shell Moulding a wide range of stainless steel components for the Chemical, Brewery and Allied Industries.

Any information you may require concerning the world-famous range of precision built POLYGRAM Shell Moulding Machines and Equipment as supplied to principal foundries in Britain and the Commonwealth, The Ministry of Supply and the Crown Agents for oversea Governments and Administrations will be forwarded on request.

One of the Shell Moulded stainless steel castings incorporated in the manufacture of a Heat Exchanger. Photographs by Courtesy of A.P.V.-Paramount Ltd.

Polygram Casting Company have a competent and complete service to offer and your enquiries are invited.

Polygram Casting Company have a competent and complete service to offer, and your enquiries are invited.

Polygram

THE FIRST NAME IN SHELL MOULDING

Polygram Casting Company Limited, Shernfold Park, Frant, Tunbridge Wells, Kent Telephone Frant 346 (5 lines)

BERKOAL keeps sand in good mouldable condition.

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Ask Berk

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BERKOAL

for foundry sands.

2%-3% BERKOAL increases green strength. Stops scabbing and expansion troubles. Reduces Coal dust.

YOU CAN TRY BERKOAL FOR NOTHING.

Just let us know how much you require to make a practical test and we will despatch gratis.

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Please send me ☐ . . . lbs. Berkoal and information leaflet.

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F. W. BERK & Co., Ltd.

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MANCHESTER GLASGOW

BELFAST SWANSEA

for SKLENAR—the casting vote!

The Sklenar type 50/150 furnace melts 150 lb. of brass or bronze in 30 minutes; 75 lb. of aluminium in 15 minutes; or 100 lb. of grey iron in 45 minutes.

SKLENAR

furnaces for general duties in the foundry.

VERSATILITY...
SKLENAR furnaces melt light alloys, brasses, bronzes, and grey iron in sequence with no risk of contamination.

EFFICIENCY...
SKLENAR furnaces give quick melts (500 lb. brass in 35 minutes) with low metal losses (maximum under 2 per cent.). Finger-tip control of atmosphere for melting non-ferrous metals is standard.

ECONOMY...
SKLENAR oil or gas fired furnaces save fuel (0·008 gallon of fuel oil or 4 cubic feet of gas per lb. of metal are typical). No crucibles to renew—no spares to worry about.

FULL TECHNICAL AND OPERATIONAL PARTICULARS AVAILABLE FROM

SKLENAR
FURNACES LIMITED

* *14 days' Free Trial in Great Britain*

385 NEWPORT ROAD · CARDIFF
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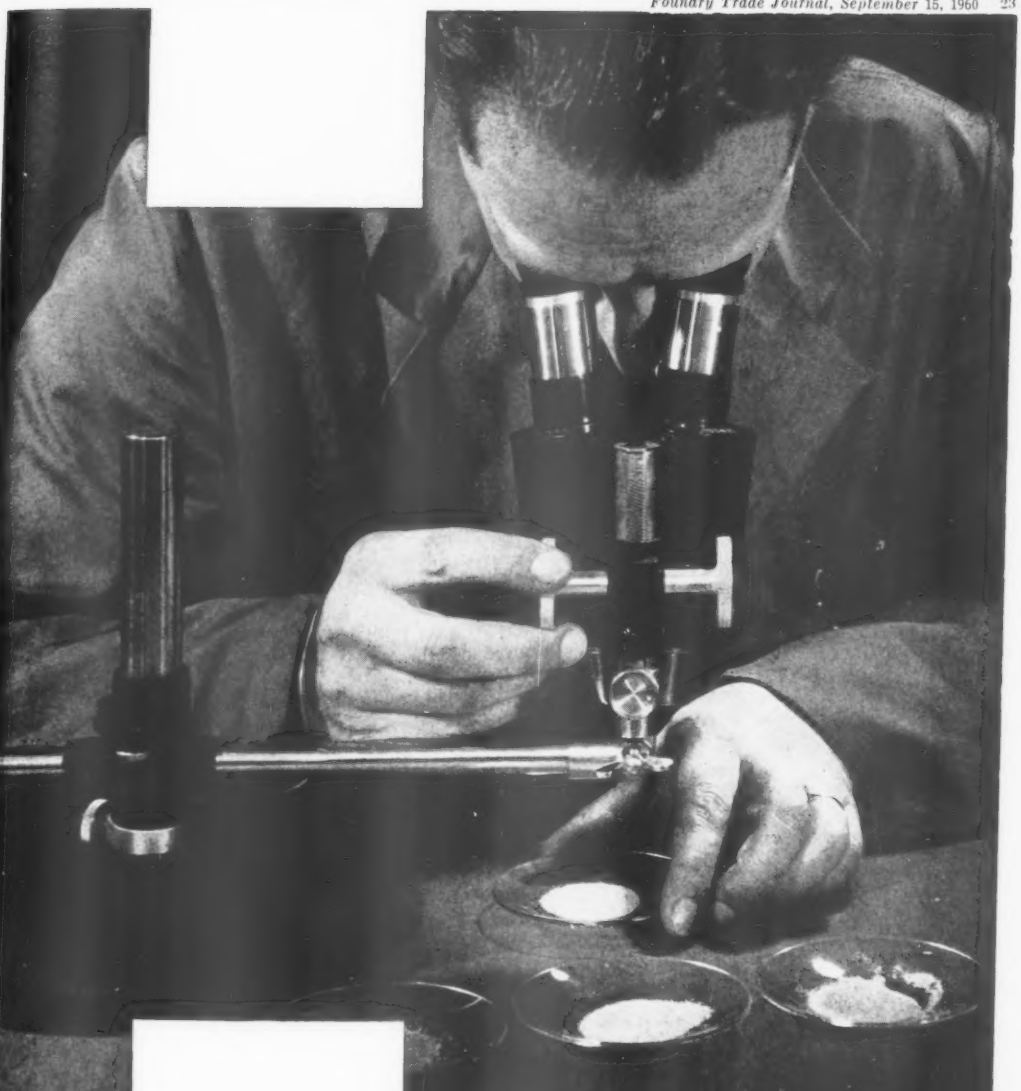
BETTER MELTING WITHOUT CRUCIBLES



Routine checking of moulding and core sand properties is essential and guarantees improved surface finish of castings, fewer rejects and economical use of sands. The production of quality castings begins with sand testing.
In many countries of the world preference is given to

Sand Testing Equipment.

Easy handling - reliable test results - pleasing appearance.

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Telephone: (053) 5 60 31/5 70 31 Telegrams: Geofischer

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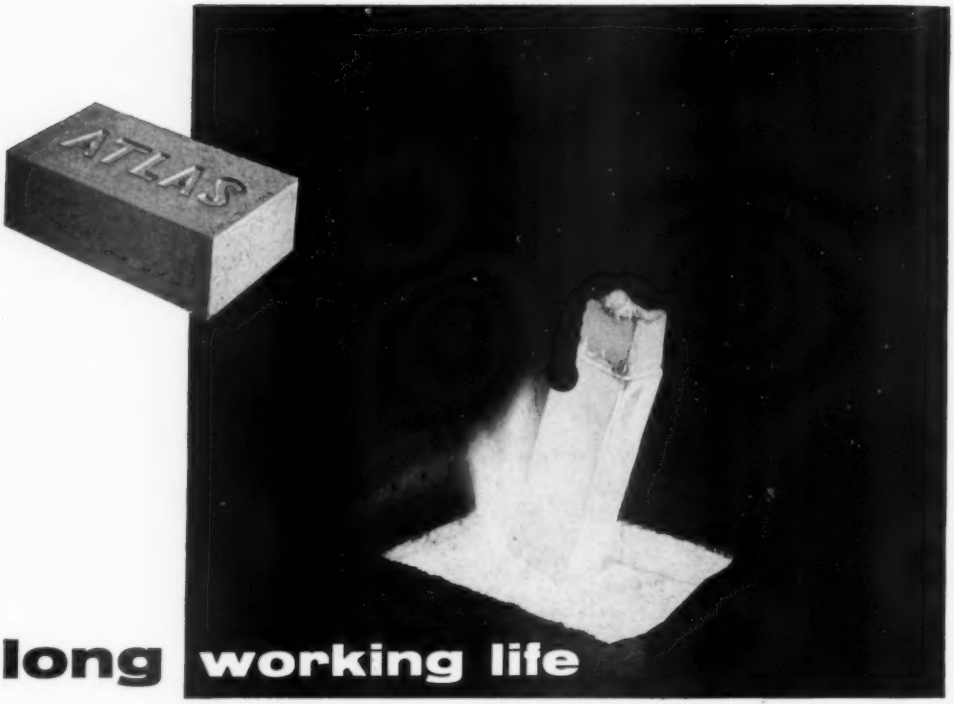


long working life

One of the ATLAS refractory lined soaking pits at the River Don Works of English Steel Corporation Ltd., Sheffield.

the essential quality of a refractory—
the ability to resist spalling and slag attack and the capacity to carry the load at high temperatures and to go on doing so for a long time.
That is the measure of ATLAS firebricks.
When next considering refractories remember that ATLAS has been 'carrying the load' for a very long time.

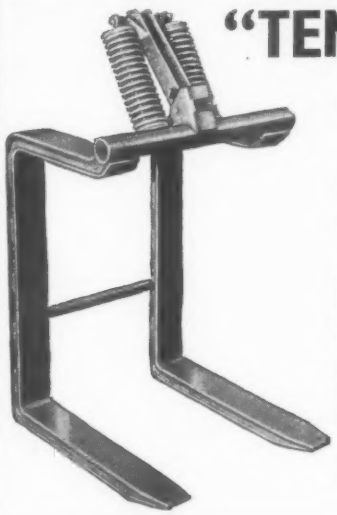
ATLAS Firebricks (37/39% Alumina)
ATLAS + A Firebricks (42/43% Alumina)
ATLAS and **SARCO** Refractory Cements
ETNA Firebricks (32/34% Alumina) for ordinary duty

UNITED FIRECLAY PRODUCTS LTD
BATHVILLE · ARMADALE · WEST LOTHIAN
REGISTERED OFFICE · 140 West George Street · Glasgow C.2
Telephone ARMADALE 313-316 Telegrams: "Combined" Armadale
A MEMBER OF THE WOODALL-DUCKHAM GROUP OF COMPANIES

FELCO
LIFTING APPLIANCES

TRIPLE GEAR CHAIN BLOCKS

SHORT HEAD-ROOM. Light weight. Compact and highly efficient. Capacities from 1 ton to 20 tons.

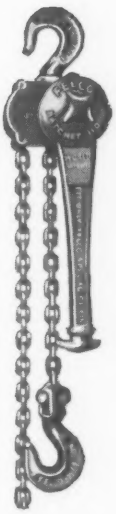


"TEMPLEWOOD"
SPRING-BALANCED CRANE FORK

Faster. . . . Safer . .
More Manœuvrable . . .

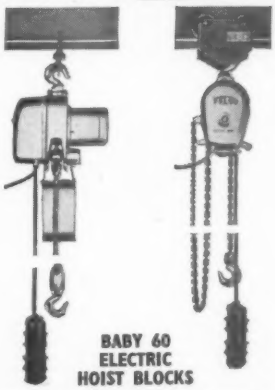
A new concept in mechanical handling which replaces chains and 'C' frames. Can be used in gangways too narrow for fork-lift trucks—this means an increase of storage space of up to 50 per cent.

Available in a range of sizes and in capacities up to 5 tons.



RATCHET HOISTS

Incorporating a patented Overload Preventer giving greater security and safety to the operator, also reducing wear and saving cost of maintenance. A ree - wheeling feature enables quick adjustment of unloaded chains.



BABY 60 ELECTRIC HOIST BLOCKS

BRITISH MADE. Patents Pending. 5 and 10 cwt. capacity. Light weight, compact and portable. Pushbutton control. Upper and lower overtravel limit switches. Supplied for any height of lift to suit requirements. Top hook suspension facilitates attachment to travelling trolleys or girder clamps, etc.

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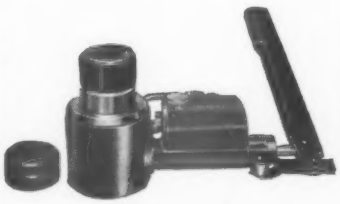

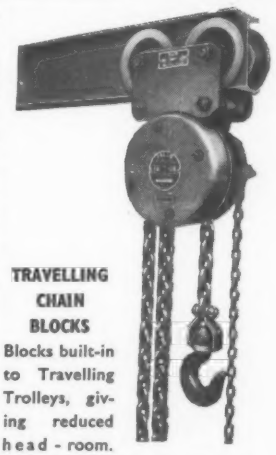

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Blocks built-in to Travelling Trolleys, giving reduced head - room. Capacities from 1 ton to 20 tons.

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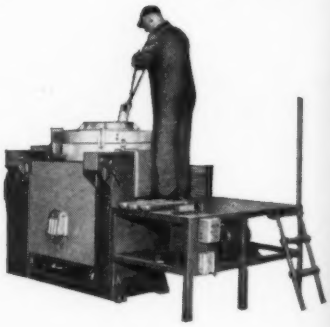
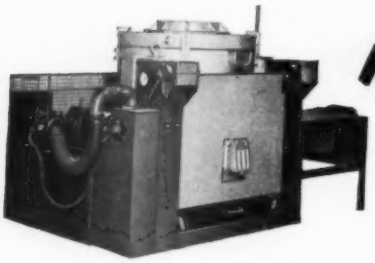
F3/60

CHARGE

From the table high platform, into the open top basin, with bulky scrap or ingots.





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By supercharge pre-heating, with an unusually high thermal efficiency, and unusually low metal loss.

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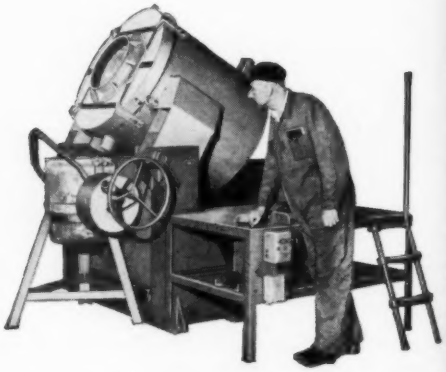
With automatic finger tip control of lip axis pouring enabling transfer ladles to be kept in one position throughout the pour. Metal can also be poured direct into Bale-out furnaces.



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BASIN TILTING FURNACE

2 crucible sizes take 380 lb Al. (1100 lb bronze) or 500 lb Al. (1500 lb bronze); rapid melting without contamination or inclusions, giving minimum rejects; low crucible cost; a high melting rate with fuel costs down to 27/- per ton aluminium, 22/- brass or phosphor bronze.

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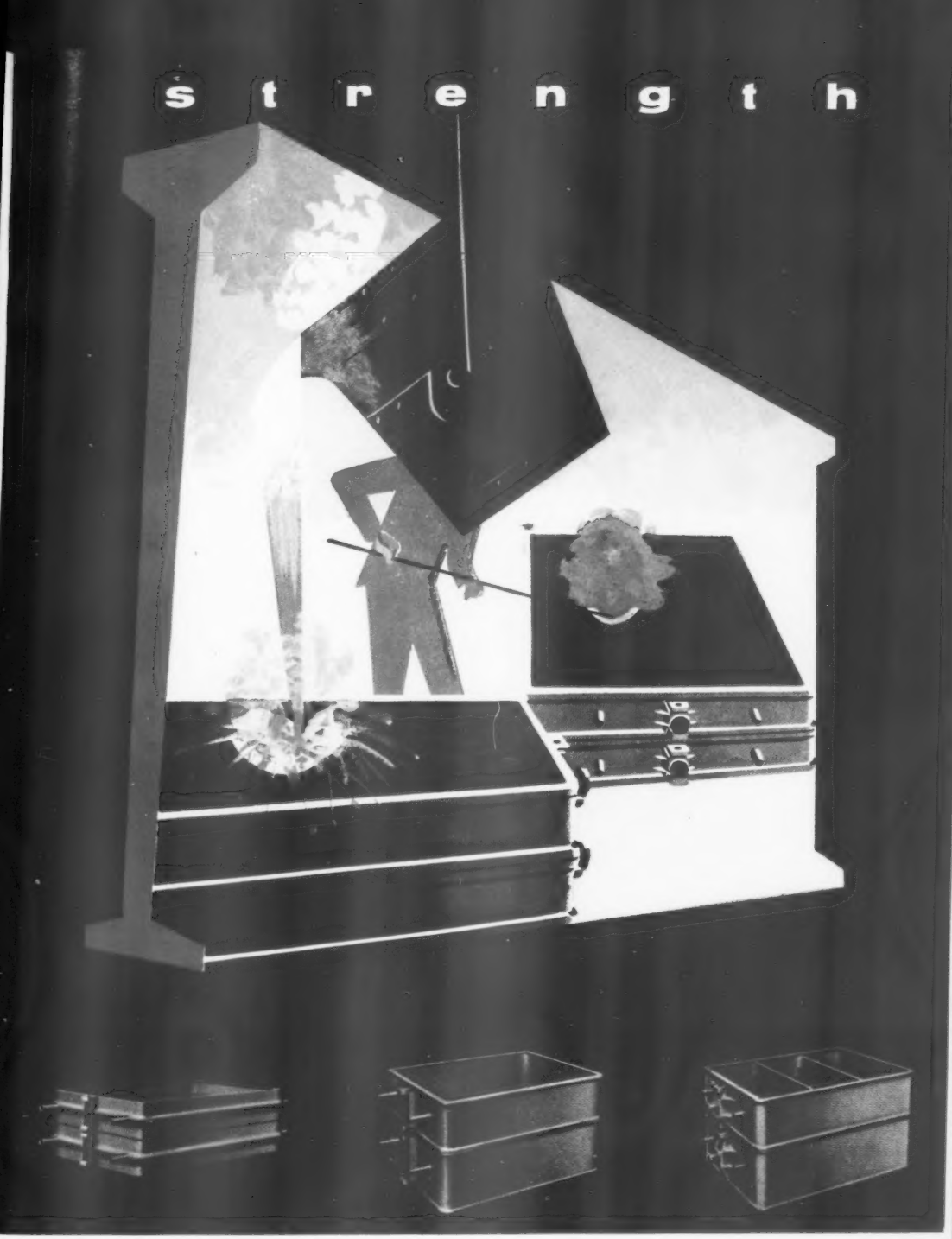

Solid flange which will not curl or crack . . .
solid rolled sections designed to resist all strains . . .
steel of special analysis . . . ensure long life in service

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TERLING FOUNDRY SPECIALTIES LTD., BEDFORD, ENGLAND

Cage

Modern carving in Ardington Parish Church of pigs feeding on acorns. Photograph by Ruth Meyler & F. C. Sillar

50 MILLION PIGS GO TO MARKET!

In the early days of the industrial revolution manufacturers frequently looked for familiar and easily recognisable descriptions of their products. To the countryman transplanted into industrial surroundings nothing was more familiar than a pig; a fact which is emphasised by carvings in scores of old churches depicting pigs suckling their litter, rooting for acorns and playing the bagpipes. (Apparently this last pastime was forsworn by pigs many years ago because of unpleasant associations between bagpipes and pigs bladders.) Consequently, when i from Blast Furnaces was directed into long troughs a from there into short and narrow troughs placed at ri angles, a resemblance to sows suckling their appenda litter led to the description of 'pig iron'.

This series of advertisements illustrates some of 'ecclesiastical' pigs and emphasises the 50,000,000 'spec pigs which Warner and Company have supplied to I Foundries producing High Duty Castings.

WARNER WARNER WARNER

"Pioneers of *Refined Pig Iron"*

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PRODUCT LIES A WEALTH
OF RESEARCH AND
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Few readers, for instance, know that the original work on the CO_2 process in this country was carried out in this laboratory nearly 10 years ago

WHICH INFLUENCES
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TO KEEP HER
TECHNOLOGICALLY
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HARBOROUGH CONSTRUCTION CO·LTD·MARKET HARBOROUGH

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FULBOND in sodium silicate bonded sands

FULBOND is used extensively in the preparation of sodium silicate bonded sands with the following advantages:—

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2 Cores are prevented from sagging and, if necessary, can be stripped from their boxes before gassing.

3 Some of the free water in the sodium silicate is absorbed, neutralising the stickiness of the sand. Sands will, therefore, have cleaner and smoother stripping properties and patching up, if required, is made easier.

4 The break-down properties of both moulding and core sands are considerably improved.

It is appreciated that too much clay in sodium silicate sands produces friability, therefore it is essential to balance the addition of FULBOND with the type and percentage of sodium silicate used.

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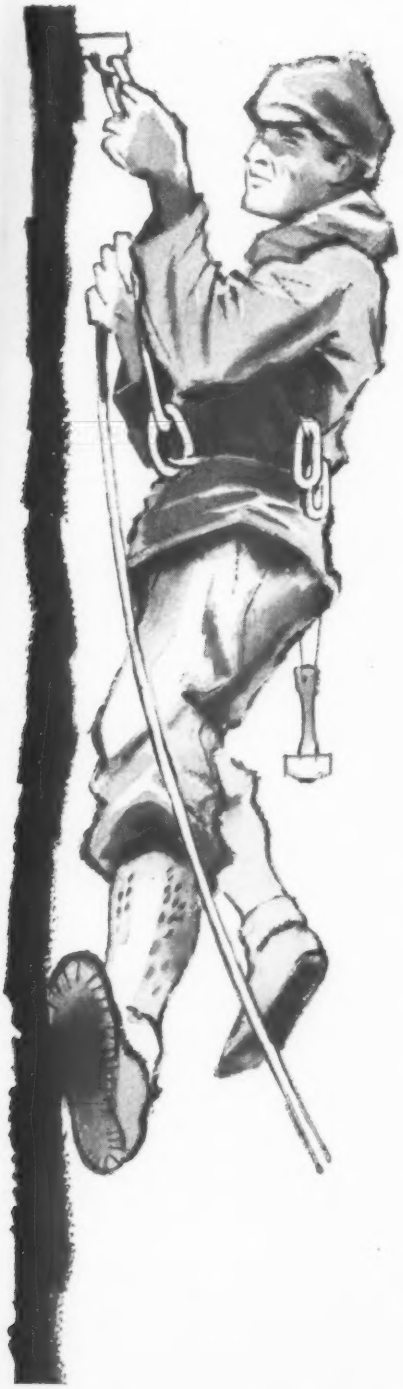

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However exacting an undertaking, experience can remove the risk and replace it with the sure touch of real confidence. In metal refining perhaps more than many other fields is this particularly so and at Park and Paterson the aids of modern science have been added to a length and degree of experience of which we are justly proud.

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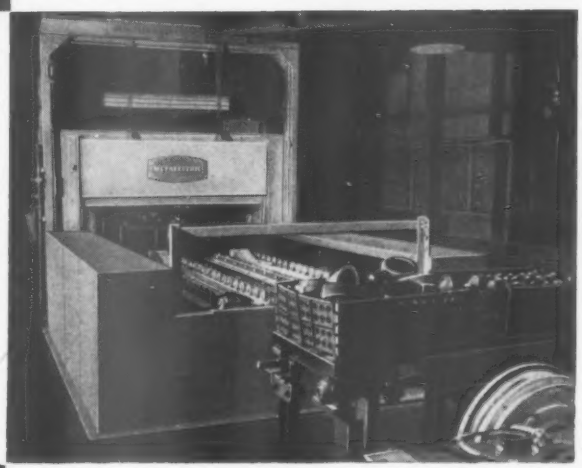
PEARLITIC AND FERRITIC MALLEABLE FROM THE SAME PLANT



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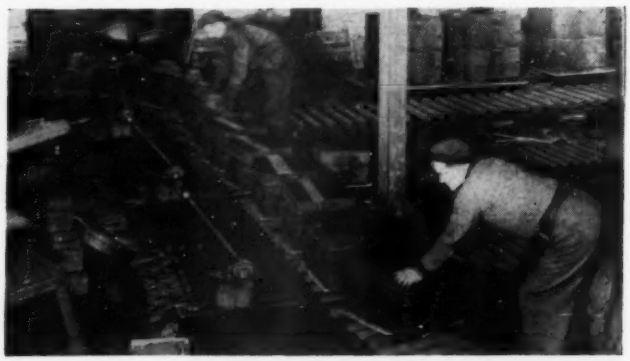

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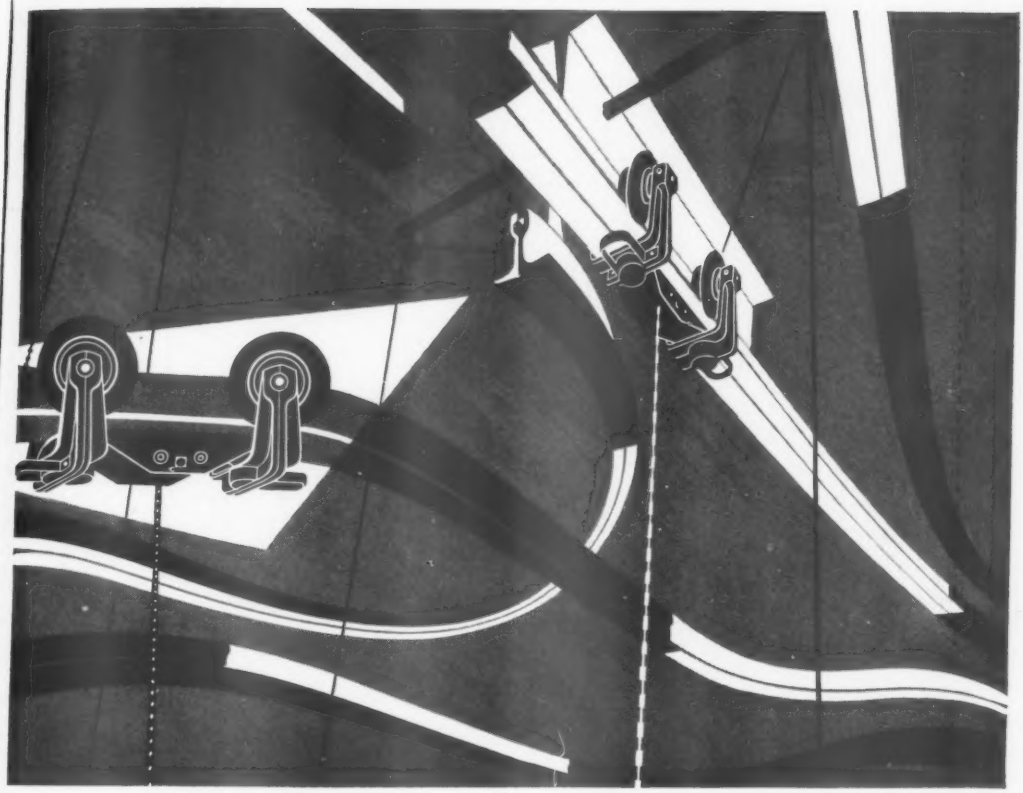
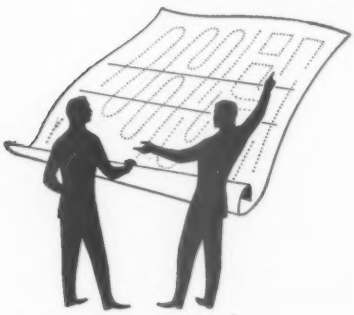


OVERHEAD is the open road



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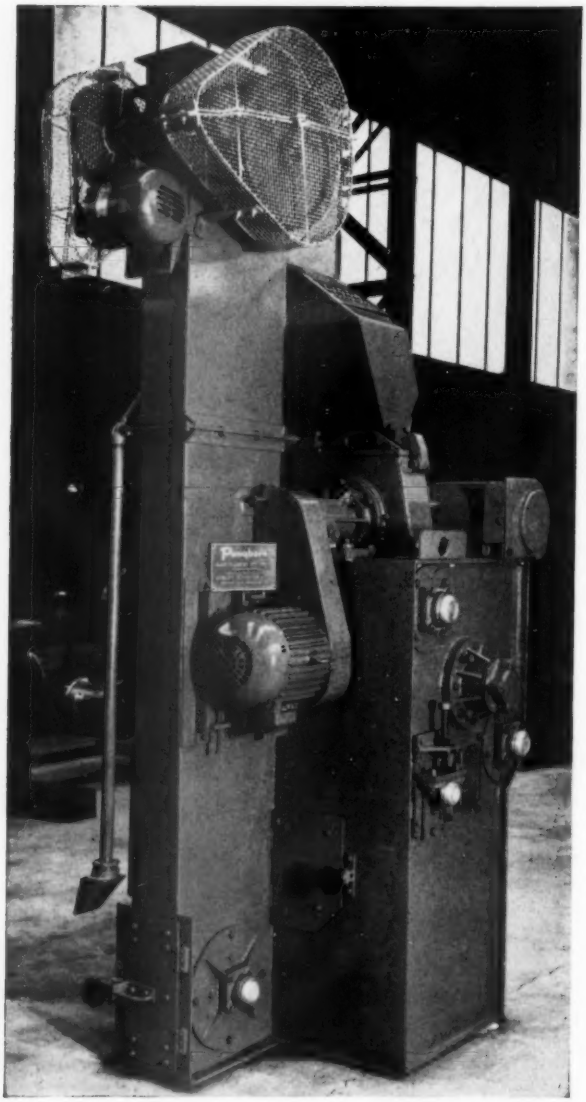

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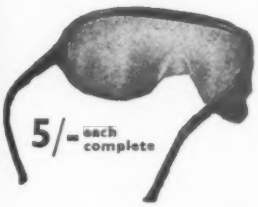

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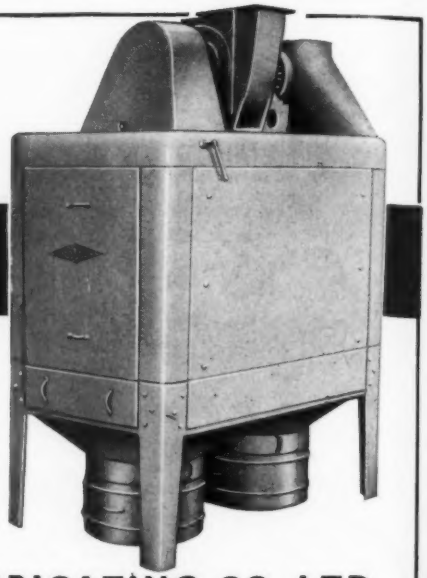

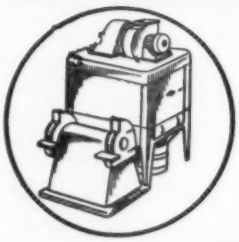

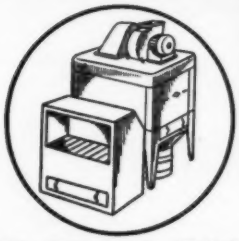

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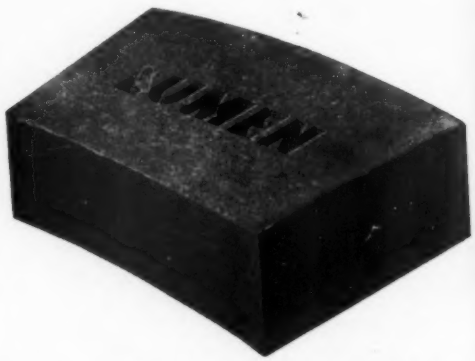

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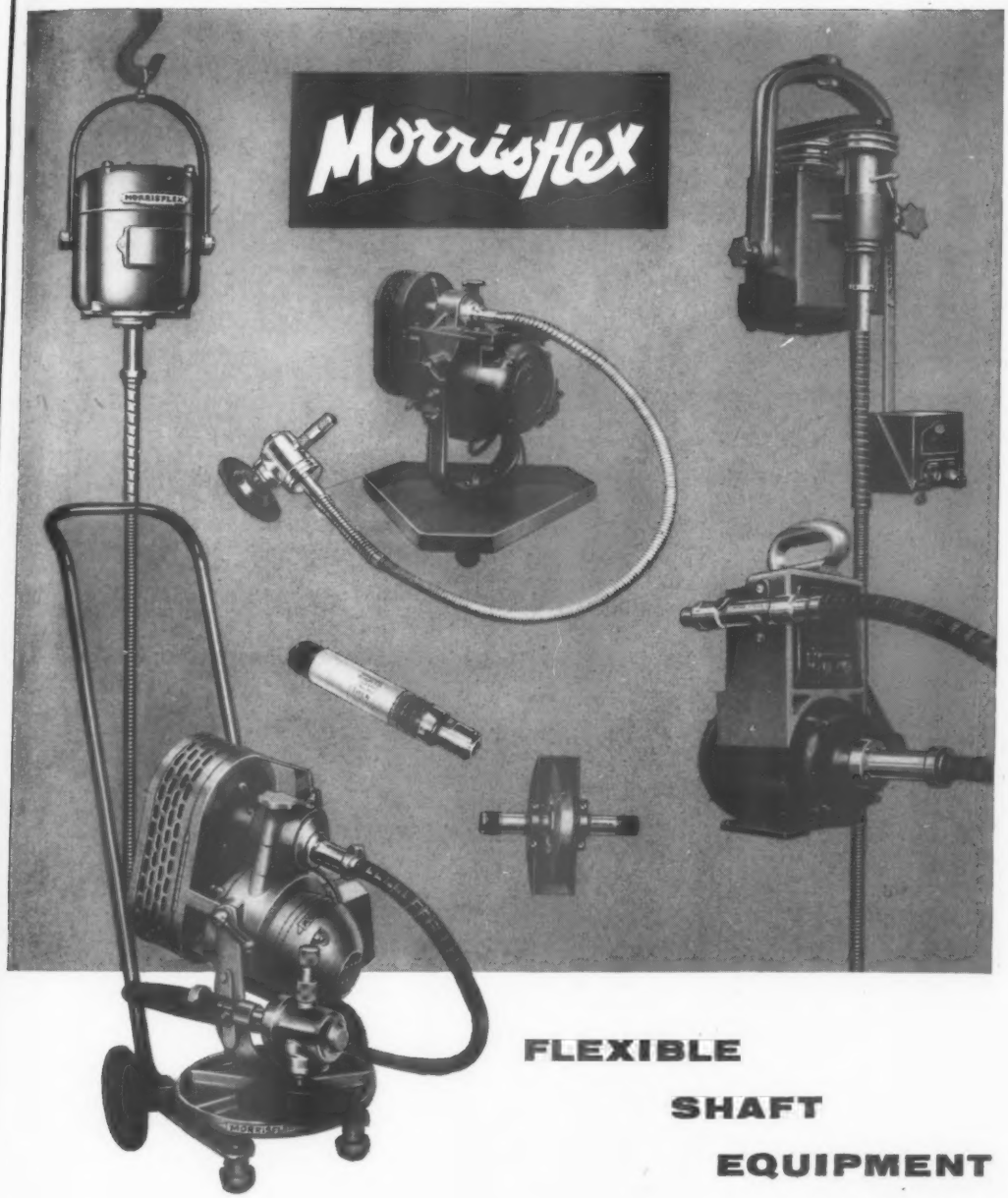

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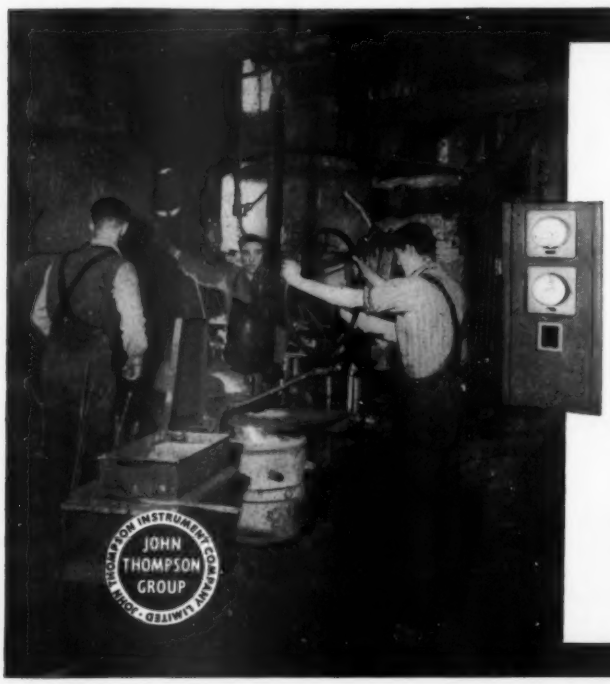

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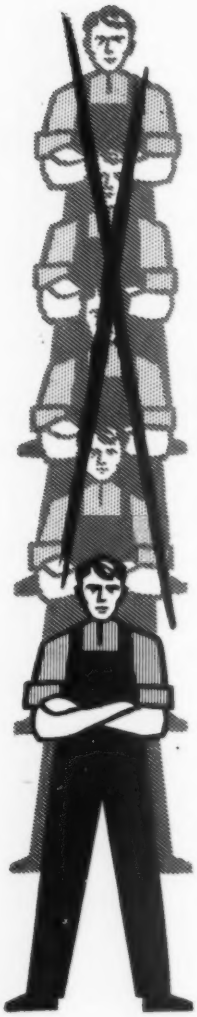

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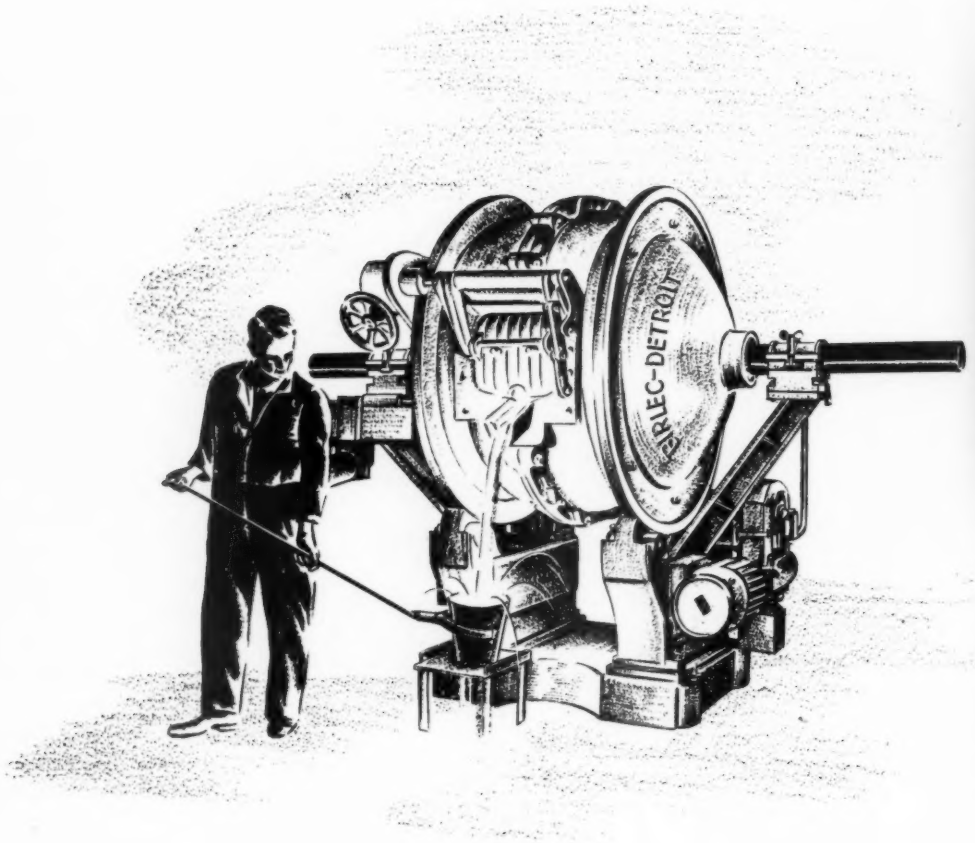

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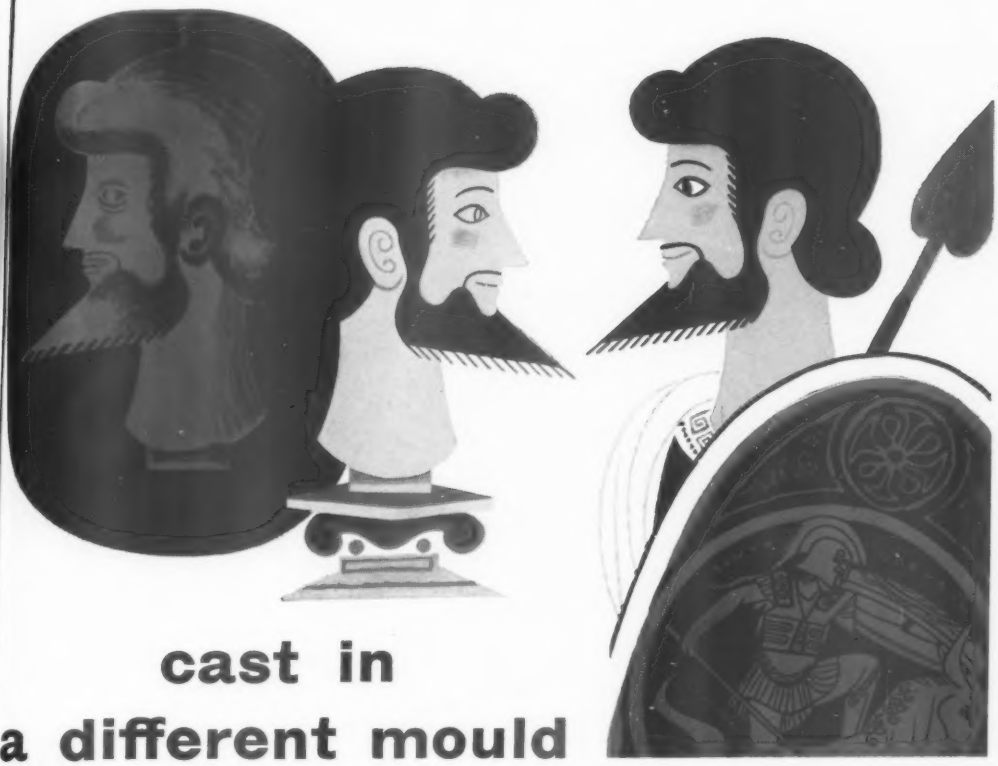

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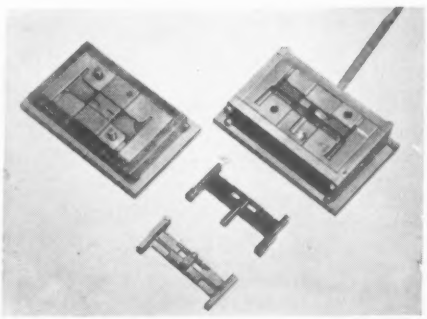

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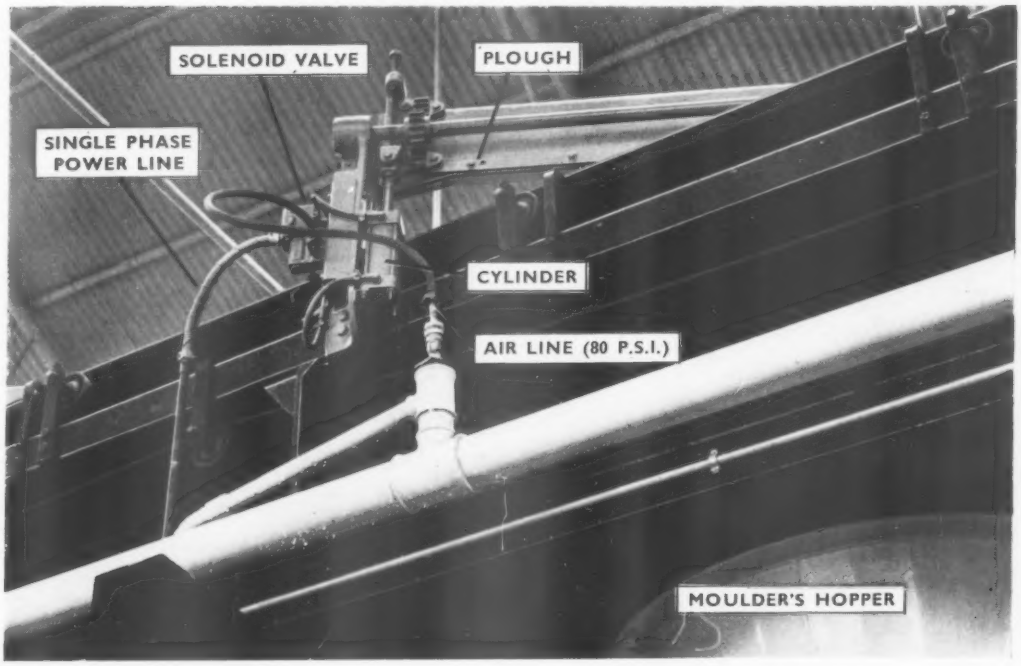

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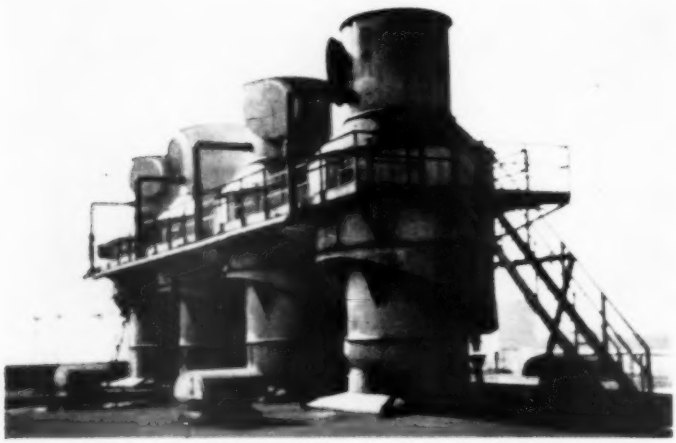

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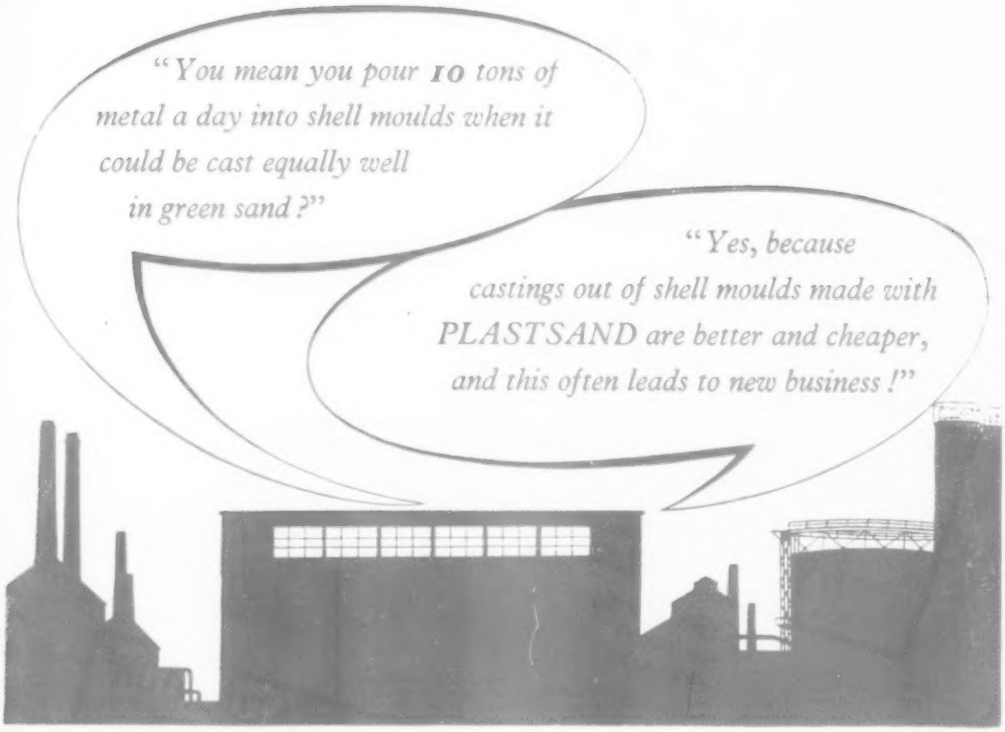
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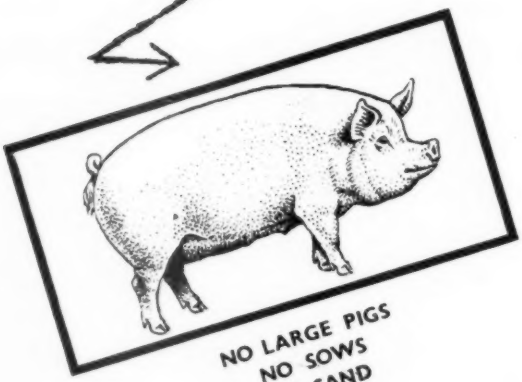

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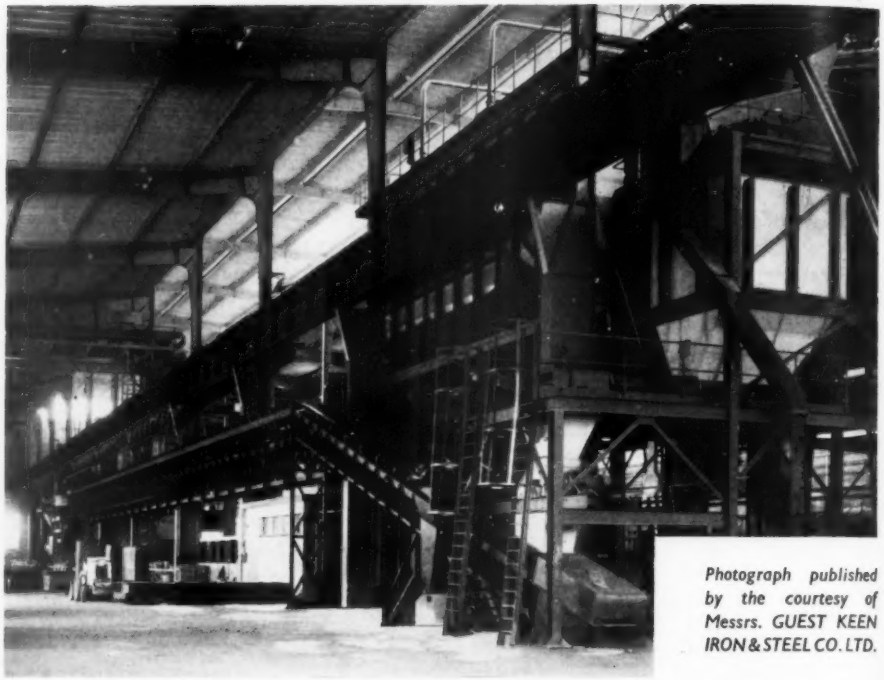

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Vol. 109 September 15, 1960 No. 2284

Foundry Industry in Switzerland

Switzerland takes its census of production every ten years and the latest employment figures available therefore relate to the year 1950. At that time, the engineering industries—a wide term probably including watchmaking—employed 222,945 people, so that to-day it is reasonable to suppose that this figure has been increased to 250,000. The 24 establishments on the visiting list of the International Foundry Congress, to be held next week in Zurich, employ 67,000 people and unquestionably comprise a representative cross-section of the Swiss engineering and metallurgical industries. Actually, the writer can think of no firm of international repute whose name is missing from the list. It is interesting to note that an art foundry is opening its doors to a visiting party during the Congress.

The industrial economy of Switzerland is based on "white coal"—that is, hydro-electric power-stations fed from the melting snow on the Alps. There is no iron and steel industry in the generally-accepted meaning of the term. Thus, the ironfoundry industry has to import its pig-iron and coke, Germany being the normal source of supply. In times of extreme shortage, however, the Swiss industry has used electric furnaces of a simple design to produce a synthetic pig-iron from steel scrap. There is no shortage of good moulding-sand in most Swiss foundry centres. As for foundry plant, the country is an important manufacturer, mostly building machines under licence from America. These they export to the Continent of Europe, but—with minor exceptions—not to this country, as this territory plus the Dominions is reserved for British licensees for the same designs.

Because of their economy, the Swiss, like the English, must export and, moreover, must overcome the high-level value of the franc. Thus, reliance has to be placed on quality of product and here Swiss-built machines rank high. To meet overseas competition, it is essential for the Swiss to keep their factories in line with the most advanced technological practice and visitors to the Congress will no doubt appreciate the local approach to such problems. As Switzerland is associated with the "Outer Seven" countries, visitors are advised to learn as much as possible about the import situation because exports from these countries will become progressively easier in the coming years. Historically, the Swiss foundry industry is of great interest, for that country was amongst the first to manufacture small steel castings and malleable tube-fittings. Viewed from no matter what angle, the Swiss foundry industry possesses something of real interest to everybody. Even the various firms' approach to publicity is noteworthy.

BSCRA invite Guest Speaker from United States

Mr. Clyde B. Jenni, research director and chief metallurgist of the General Steel Castings Corporation, Eddystone, Penn., whose portrait is shown alongside, will present a paper on "Technical Control in Steel Foundries in North America" to the annual conference of the British Steel Castings Research Association, which is to be held in Harrogate on October 20 and 21. Under an arrangement between the Steel Founders' Society of America and the BSCRA, an exchange lecture is being given every year to the annual conference of each organization. Dr. A. H. Sully, a director of research of the BSCRA, presented last year a paper on the subject of "Atmospheric Dust and Noise in Foundries" to the technical and operating conference of the SFSA, held in Cleveland, Ohio.

MR. CLYDE B. JENNI

Mr. Jenni, who was born in 1902, in Clarington, Ohio, is a graduate in chemical engineering of W. Virginia University. After a short period with the Kelly-Springfield Tire Company, and Blaw-Knox, Mr. Jenni, from 1928 to 1938, held the post of instructor and assistant professor in the Chemical Engineering Department (metallurgical subjects) at W. Virginia University. He then re-entered industry and became plant metallurgist at the Eddystone works of the General Steel Castings Corporation. In 1951, he was promoted chief metallurgist, and was appointed director of research in 1960. Mr. Jenni is a member of several technical societies, including the American Institute of Mining and Metallurgy, American Society for Testing Materials, American Society of Metals, the American Foundrymen's Society, and the (British) Iron and Steel Institute.

Forthcoming Events

[The Editor would be pleased to receive from the secretaries of the various technical associations details of their programmes for the 1960/61 session for inclusion in this column.]

SEPTEMBER 21

Institution of Production Engineers

The 1960 E. W. Hancock Paper, entitled "The Cult of Self-made Man" will be delivered by John Marsh, 6.30 p.m., at the Royal Commonwealth Society, London.

Institution of Plant Engineers

Kent branch:—"Insulation of Factories and Buildings," by N. Foster, 7 p.m., at the Kings Head Hotel, High Street, Rochester.

SEPTEMBER 22

Institution of Plant Engineers

Merseyside and North Wales branch:—"Some Engineering Problems with Chemical Plant," by J. C. Veale, 7.15 p.m., at the Exchange Hotel, Liverpool.

CHANCE BROS., LIMITED—Dr. W. M. Hampton is retiring this month as managing director He is succeeded by Mr. C. J. S. Newman.

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL.

TOO MUCH ABOUT MECHANIZATION?

SIR,—Your correspondent, under the above heading (August 25, 1960), criticizes the JOURNAL and the foundry industry for "neglecting the more highly skilled sections of the industry (*i.e.*, loose-pattern work, etc.) and ends by posing the question "why is the skilled job so unpopular?" The answer is not hard to find. It is simply that it does not pay.

The foundries producing the jobbing type of casting have recently passed through a period of severe trade recession, causing keen competition, and a good deal of price-cutting, a situation which some buyers have been quick to exploit fully. As a direct result, many foundries have closed, and many skilled men have left the industry.

Of late, there has been an increase in the volume of work available, but competition is still keen, and profit margins far too low in comparison with other industries. Your correspondent also says, "This type of work is being turned down more and more by foundries who prefer to seek more straightforward work which can be plated or produced on mechanized plant." Can this be wondered at? The jobbing founder who possesses some machines can produce castings from plated patterns, at a price to compete with those of large mechanized plants, though not in comparable quantities. As production is greater than from loose patterns and profit, weight for weight, probably as good or better, the founder naturally prefers machine or plate work.

The writer's own criticism of the foundry trade concerns the apparent reluctance of its members to discuss prices, a subject which seems to be surrounded by some sort of "taboo." One can peruse the pages of the JOURNAL over a period of years without being able to discover the mention of a single casting price*. Only one section of the industry seems to realize the necessity for co-operation on prices. Yet if other jobbing founders are to survive, there must be some liaison between them to ensure a reasonable margin of profit, and to eliminate cut-throat competition. When this is achieved, the jobbing founder will be in a position to pay his skilled workers a wage comparable with the earnings of the unskilled "machine moulders" of the mechanized plants.

Yours etc.,

A. E. WILES.

38 Banbury Road,
Stratford-on-Avon.
September 3, 1960.

(*No one can ever say what the proper price for a single casting *should be*, so much depends on a variety of circumstances inseparable from the set-up of those called upon to quote. The proper costing of foundry operations, however, is another matter and over the years there have been innumerable articles and exhortations in the JOURNAL for founders "to put their house in order" in this respect. Furthermore, it has always been the policy of the JOURNAL to encourage and foster liaison between foundrymen in technical, research *and commercial* fields and the deliberations of such bodies have been reported on at every possible occasion. There is no doubt at all that indiscriminate price-cutting can undermine the financial stability of the whole industry and we join with our correspondent in deprecating the practice and realizing its evils—and the long tentacles of its consequences. But the remedy lies in the hands of founders themselves!——EDITOR.)

Six Danish Foundries

Thirteenth Annual Tour by Students from the National Foundry College surveys Notable Continental Establishments.

This year, Denmark was chosen for the annual visit of students of the National Foundry College and six foundries and other places of interest were toured. What follows is an "on-the-spot" description of the companies visited and notes on the equipment installed and types of production seen. The visits commenced on Monday, May 23 and ended on Thursday, May 26; the 1960 tour was the thirteenth similar tour made by College students. In all cases, the success of the tours is dependent on the goodwill of the managements concerned, and the kindness and active co-operation given in every Danish foundry visited made the 1960 tour a memorable occasion.

Burmeister and Wain*

The first visit of the 1960 study tour of National Foundry College students was to Burmeister & Wain, a company established in 1843 and now recognized throughout the world as shipbuilders and diesel-engine specialists. The company are Meehanite licensees. The head office and main works are at Christianshavn and another engine-works is operated at Wildersplads. Activities of other subsidiary companies include the assembly of certain products of the Standard Motor Company, Studebaker, Lambretta, and the distribution of Ferguson tractors.

Castings production is mainly concentrated at Teglholmen and the general arrangement of the production units and ancillary shops is shown in Fig. 1. The annual output of approximately 15,000 tons of grey-iron castings, 6,000 tons of steel castings, and 500 tons of non-ferrous castings probably make the Burmeister & Wain plant the largest in Scandinavia. Castings ranging from a few pounds to 30 tons are made, and the work is mainly of a jobbing nature, so often associated with shipbuilding; diesel-engine castings form a substantial part of the total output. In addition, brake-shoes for the Danish State Railways are made in large quantities.

The Teglholmen installation (seen in the aerial photograph, Fig. 2) is unique in many respects, not least in the general location which is such that all raw materials and finished castings can be handled rapidly by the large crane and quayside facilities adjoining the foundry. An outstanding feature of the layout is the cylindrical foundry building—which is now wellknown to the majority of those interested in the design of foundry buildings. It is 300-ft. in diameter and 90-ft. high and though 38 years old, still houses most of the castings production and some of the foundry administration activities also. The principal roof support is a substantial steel centre-column which passes through a centrally-located administration section, and also serves as the pivoting member for seven cranes operating radially. The latter are arranged at various levels so that each can, if necessary, traverse the whole foundry area without obstruction. In the main bay, all the large castings are

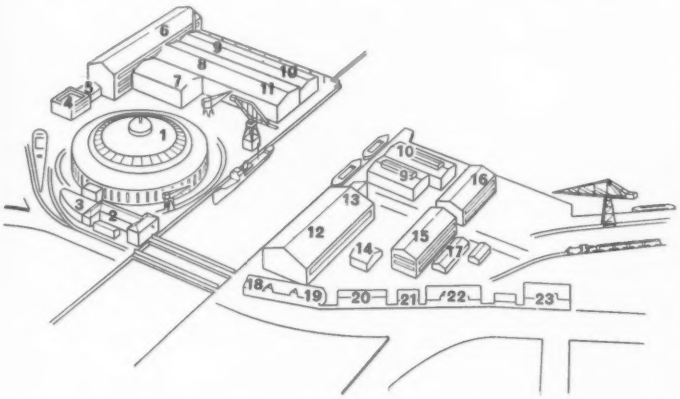


FIG. 1.—*General arrangement of the foundry production units and ancillary shops at Burmeister & Wain, Teglholmen.*

Key: (1) Iron and steel foundry; (2) administration; (3) locker rooms; (4) compressor house; (5) locker rooms; (6) steel moulding shop (light work), pattern shop, pattern store; (7) steel furnaces; (8) steel moulding shop (heavy work); (9) forge; (10) rough turning shop; (11) press; (12) iron fettling plant; (13) steel fettling plant; (14), (15) and (16) pattern stores; (17) foundry stores; (18) employees' baths; (19) repair shop; (20) laboratories and locker rooms; (21) compressor house; (22) metallurgical laboratory, and (23) accomodation for "key" employees.

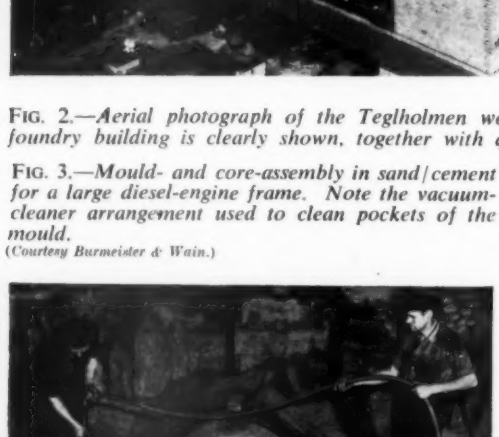
(*Courtesy Burmeister & Wain.*)

* Shortly described previously in the JOURNAL, August 1, 1957.

(*Courtesy Burmeister & Wain.*)

FIG. 2.—*Aerial photograph of the Teglholmen works of Burmeister & Wain. The unique cylindrical foundry building is clearly shown, together with quayside, dock cranes and rail services.*

FIG. 3.—*Mould- and core-assembly in sand/cement for a large diesel-engine frame. Note the vacuum-cleaner arrangement used to clean pockets of the mould.*
(*Courtesy Burmeister & Wain.*)



made using sand/cement methods, though some orthodox dry-sand moulding is carried out. A typical mould- and core-assembly, made in sand/cement in the foundry floor and intended for a diesel-engine frame, is illustrated in Fig. 3, where it can be seen that a vacuum-cleaner arrangement is being used to clean out deep pockets in the mould. Fig. 4 shows the sand/cement plant itself, consisting principally of three silos for new beach-sand, used sand/cement and cement respectively in addition to mixing units. Beach sand is brought to the foundry in pump-type dredgers and the cement in bulk tank wagons. Three Simpson sand-mixers, each of 66-gal. capacity, and designed for semi-automatic feed, are housed beneath the silos. The sand/cement mixture is made in batches as required, the material containing 8 per cent. cement and 8 per cent. water in summer, and 8 per cent. cement and 6 per cent. water in winter.

Other Typical Castings

It is interesting to note that centrifugal casting is not favoured for the production of cylinder-liners in these works and Fig. 5 shows—inter alia—the pouring of a large diesel-engine cylinder-liner in a stationary mould. Smaller castings and some of the cores are produced in the areas near the walls of the shop and some very substantial jolt/turn-over machines are installed. Lighter types of castings, particularly brake-shoes, are made on an upper-gallery floor, which extends around the building and the pouring arrangement used here is illustrated in Fig. 6. The production from a pair of moulding machines is geared to a conveyor which traverses almost the whole 1,000-ft. distance

around the inner wall of the building. Moulding and pouring of small non-ferrous castings is also located on the gallery floor. Three cupolas, with a potential of 12 tons per hr., and a direct-arc furnace of 7½ tons capacity are available for iron production.

Cleaning and fettling operations at Teglholmen follow well-established practice, but there are features which must surely be unique. An excellent large-capacity water-blast type of cleaning unit, designed and built on the premises, is in use and the building appeared to the visiting party to be a model of cleanliness and order. The latter is no doubt due in part to the use of barge transport as two barges (one of 100 tons and another of 150 tons) are in continuous use for the disposal of old sand and the removal of castings to the company's machine-shops. Since the loading stations are in the middle of the floor where cleaning and fettling are carried out, the rubbish accumulations unfortunately so typical of large-scale jobbing work are avoided.

Steel Moulding

The four-storey building shown in the foreground of Fig. 2 accommodates the steel-moulding section on the first floor, a pattern-stores and works canteen on the second floor, and further facilities for pattern storage exist on the third and fourth floors. As in some British steel foundries, steel castings production at Burmeister & Wain is linked to a greater demand for steel ingots which are intended for forging or pressing. Two oil-fired, basic open-hearth furnaces, each of 35-tons capacity, are operated to produce approximately 27,000 tons annually. (These furnaces are scheduled, however for replacement in the near future by direct-arc electric units.) The adjacent press-shop is equipped with 750-ton and 2,000-ton presses and nine pneumatic hammers.

The pattern equipment and mould for a sternpost casting in steel, intended for a fairly large ship, is seen in Fig. 7 and the fettling of another large steel ship's casting is illustrated in Fig. 8.

After visiting the foundries of Burmeister & Wain, the party from the National Foundry College was entertained in the celebrated Tivoli Gardens and afterwards toured the Carlsberg Breweries. The latter proved to be extremely interesting and the products were sampled on a substantial scale by courtesy of the company (Figs. 9 and 10).

FIG. 4.—*Sand/cement preparation plant on the waterside at the Teglholmen foundry showing the silos for new beach-sand, used sand/cement and raw cement respectively, below which the mixers are housed.*
(Courtesy Burmeister & Wain.)

Frederiksund Jernstoberi Maskinfabrik

On Tuesday, the students travelled from Copenhagen and divided into two groups; one group proceeded to Frederiksund to visit the iron foundry and machine-tool works there. At this town, there has been a works on the present site for almost 100 years and the existing plant is a model of good functional layout in all sections—foundry, machine-shops and assembly shops. Sawing machines, large and small drilling machines, and many special-purpose machine-tools, produced by the firm are exported to 18 different countries and the trade name Fioma is recognized throughout the world for quality equipment. The company also make various items of coke- and coal-handling equipment.

The foundries are not large by some standards, but are thoroughly equipped and organized for the jobbing work which is characteristic of this type of production. A wide range of cast irons is made, conforming to all Continental and other specifications. A mechanically-charged cupola is installed for grey irons and a Birlec Detroit rocking-arc unit of 1,000-lb. capacity is available for alloy-iron production. Hand-moulding practice is established, but some sand/cement work is also carried out.

United Iron Foundries Company

The second party of students from the College paid a visit to the Frederiksverk factory of the United Iron Foundries Company, well-known to many English foundrymen as the D.F.J. concern. (Many illustrations of the foundry activities

(*Courtesy Burmeister & Wain.*)

FIG. 5.—*Pouring of a large diesel-engine cylinder (centre), along with other operations in part of the main foundry.*

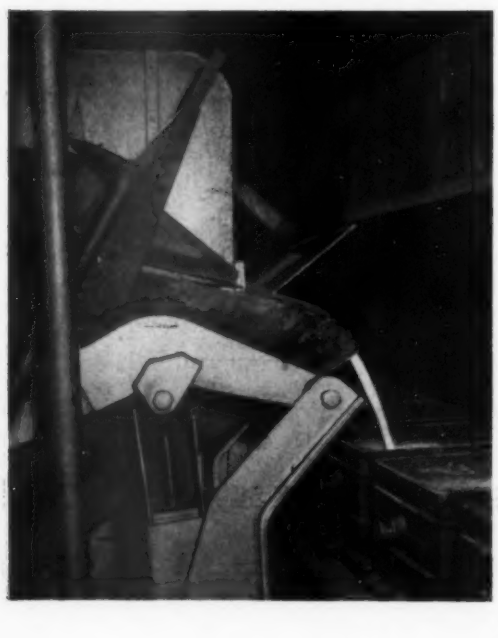


FIG. 6.—*Pouring arrangement used for the smaller castings produced at Burmeister & Wain. These light castings are made on an upper gallery which extends around the cylindrical building.*
(*Courtesy Burmeister & Wain.*)

carried out by this company appeared in the FOUNDRY TRADE JOURNAL, August 1, 1957.) The site at Frederiksverk has been used for industrial purposes since 1728, but was first used as a foundry in 1756. It is a tribute to the builders of two centuries ago that some of the original buildings are still in use to-day. The United Foundries Company took over the Frederiksverk plant in 1928 and have other works in Naestved which produce air-conditioning equipment, automatic oil-firing plant and pressure-die-castings. At the Frederiksverk works, 770 people are employed, including 120 staff. An unusually wide range of castings is made—for central-heating boilers,

FIG. 7.—*Pattern equipment and mould for a stern-post casting in steel for a fairly large ship.*
(*Courtesy Burmeister & Wain.*)

gas- and electrically-heated cooking ranges, pots, pans, and various kitchen appliances. In addition, a substantial number of castings is produced for small diesel-engines, oil pumps, compressors, refrigerators, electric motors, and agricultural equipment; the largest casting made by the company weighs approximately 650 lb. For the past 20 years, blackheart malleable iron castings have been produced and more recently, spheroidal-graphite irons under licence from the Mond Nickel Company, Limited.

Output Details

A limited amount of shell moulding and CO_2 work is done, but greensand methods are used for the majority of the output. Local sands are used for moulds and cores and Danish bonding clays are used wherever possible. The foundries are divided into two production units; one located near the harbour is equipped to make central-heating boilers and the second for all other castings. Approximately 12,000 tons of finished castings and 16,000 gas- and electric-cookers are produced annually; hollow-ware production amounts to 100,000 items per year; the trade name of Anker enamelled-ware being wellknown in the high-quality market.

In the boiler-production section, iron is supplied from two 5-ton capacity cupolas with siphon-bricks tapping and tilting forehearths. The boiler segments are made on pattern-draw machines, using pneumatic rammers, and are stacked three high upon the floor for casting. This method seems rather precarious, but works well in

FIG. 8.—*Fettling of a large steel casting for a combined stern-post and rudderframe.*
(*Courtesy Burmeister & Wain.*)

FIG. 9.—*Foundries were not the only places to be visited and members of the party from the National Foundry College are shown in this illustration at one of the entrances to the famous Carlsberg breweries.*

practice and gives maximum utilization of the available floor space.

In the general foundry, sand preparation is carried out in a Swiss automatic plant supplied by George Fischer. The melting section was completely reorganized in 1958 and now consists of two hot-blast cupolas, each rated at 5 tons per hr., and two mains-frequency electric units, each rated at 3 tons each. Swiss moulding machines of the jolt/squeeze/pin-lift type are favoured, but some snap-flask machines and roll-over units are also installed. The larger cores are made by hand, using linseed oil and a dextrin binder, but core-blowers and coreshooters are very much in evidence for the lighter work. Wheelabrator cleaning equipment is popular and some hand shotblasting is also done.

M. P. Allerups Efterfolgere A/S

On Wednesday, May 25, the College Party travelled to Odense where once again they divided into two groups, the first visiting the works of M. P. Allerups Efterfolgere A/S. These works employ approximately 400 men in the foundry, machine-shop and boiler shop. The foundry is arranged for hand- and machine-moulded work. In the heavy section, castings up to 12 tons each are made with the aid of a mobile Sandslinger, orthodox dry-sand practice is followed in some cases and CO_2 methods are used for other work. The castings produced by this company are intended for shipbuilding, diesel-engines, rubber-vulcanization machinery and electric motors.

Automatic Moulding Unit

In the machine-moulding department, pneumatic jolt/squeeze machines are installed and a wide range of castings down to one ounce in weight is made. An especially interesting unit is a fully-automatic installation made by Westin & Backlund (Fig. 11). This is an eight-stage machine arranged so that sand is first riddled on to the pattern which is then moved to the second stage where backing sand is applied. The third and fourth stages are occupied in jolting and squeezing respectively and stages five and six are those where the mould part is rolled over and stripped. In the last stages of the sequence, the patternplate is cleaned with an air jet, sprayed with a parting agent and turned over in readiness for the complete cycle to begin again. The moulding unit is served by a continuous pouring and shake-out system.

Melting equipment here includes two "Equiblast" cupolas, with a melting rate of 6 tons per hr., and a mains-frequency electric unit of 6-tons capacity, rated at 1,200 kW. A total annual output

FIG. 10.—*Visiting foundries is thirsty work, and the party welcomed the opportunities afforded by the change of venue to partake of the "local brew."*

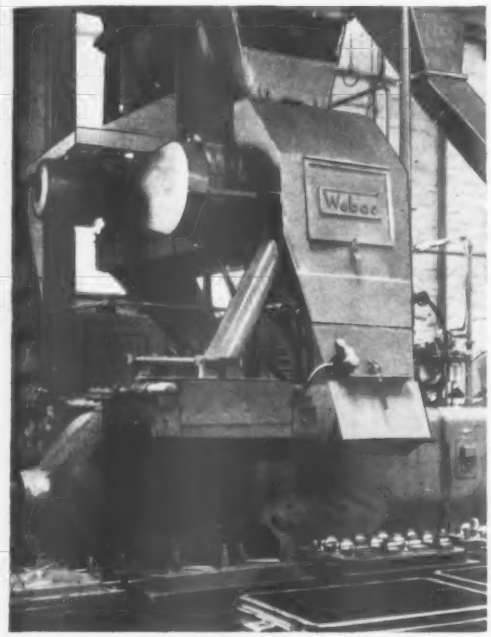


FIG. 11.—*Part of a fully-automatic mould-producing installation, made by Westin & Backlund, at the works of M. P. Allerups Efterfolgere A/S.*

of 6,000 tons of finished castings is obtained in the various grades of Meehanite, spheroidal-graphite and malleable cast iron which are produced.

A/S H. Rasmussen & Company, Limited

The second group of students from the College visited the works of A/S H. Rasmussen & Company, Limited, a firm originally established in Odense as boiler and stove manufacturers in 1856. Some years ago, another works in Hjallese was taken over and a total of 700 people are now employed. The foundry at Odense is employed on general work, making approximately 5,000 tons of castings annually. "General work" is the ubiquitous description applied to a great variety of castings made here for sugar machinery, machine-tools, automatic stokers, domestic bread-slicing machines, air-compressors, floor-plates, diesel-engines, electric hot-plates and radiators, woodworking equipment, weighing machines, electrcity-generation and transmission equipment. Fig. 12 shows typical castings produced in the machine-moulding section, which is based upon a central installation of ten jolt/squeeze machines of Ukas design. Synthetic sand is used and metal is supplied from two water-cooled cupolas of 3- and 5-tons capacity per hr. respectively. A 12-tons capacity mains-frequency unit of Tagliaferri design is also installed and it is proposed to instal yet another furnace of this type.

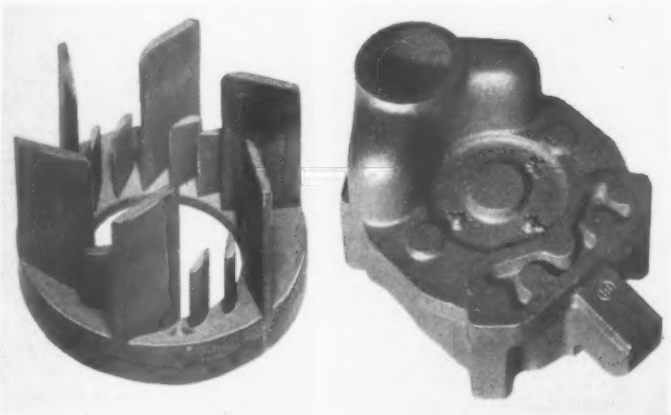


FIG. 12.—*Grey-iron castings typical of the smaller range made by A/S H. Rasmussen & Company.*

Notable Cupola Installation

Since 1947, radiator and stove production has been carried out on an increasing scale at the Hjallese plant, the present output being 4,500 tons annually. The cupola installation is a hot-blast unit of MBC design. Great trouble and care has been taken here to improve the appearance of the cupola structure and the melting plant is housed in a steel-framed building, panelled completely in concrete blocks, each having a glass block cast in the centre (Fig. 13). This arrangement, together with an excellent spark-arresting system, contributes towards an extremely clean and tidy furnace installation. Another point of interest at these works is a roller/squeeze moulding machine of local design which was being used very effectively for the rapid production of light castings in twin box-parts.

(When the two visits concluded, both groups re-formed as a party and were entertained by the managements of M. P. Allerups and H. Rasmussen jointly.)

Jernstoberiet Dania A/S

The visit to Jernstoberiet Dania A/S, in Aarhus, originally planned for the Thursday, had unfortunately to be cancelled since the date selected was a Danish national holiday. Despite this, the works director kindly gave up part of the day to

FIG. 13.—*Exterior of the MBC cupola installation at A/S H. Rasmussen & Company. The cupola structure is housed in a steel-framed concrete building, panelled completely in concrete blocks, each having a glass block cast in the centre.*

conduct a small party through the works. Jernstoberiet Dania is a "young" concern (not yet 20 years old) but is now well established as a manufacturer of high-grade grey-iron and s.-g. iron castings in the small and medium weight-range. From modest beginnings, a modern well-equipped foundry has emerged, comparable with the best elsewhere. Hand and mechanized moulding is carried out on a considerable scale and both cupola and electric melting-facilities are available. S.-g. iron production is an important part of the total output and reaches 500 tons annually, cast crankshafts (Fig. 14) of various sizes being made in such large numbers that this company may well be among the leaders in this specialized field. The production arrangements in this and all other sections of the works reflect great credit upon all concerned.

Varde Staalvaerk

The final works to be visited by the party from the National Foundry College was the Varde Steelworks. These were founded in 1914 and became jointly owned in 1921 by the Naksoz Shipyard and F. L. Smidth & Company, Limited. Regular extensions since that time and a substantial reorganization programme in 1957 have contributed to make the works an excellent example of modern steelfoundry organization and practice. Since steel production is not linked here to the manufacture of ingots, the installation can be regarded as being the largest steel foundry in Scandinavia.

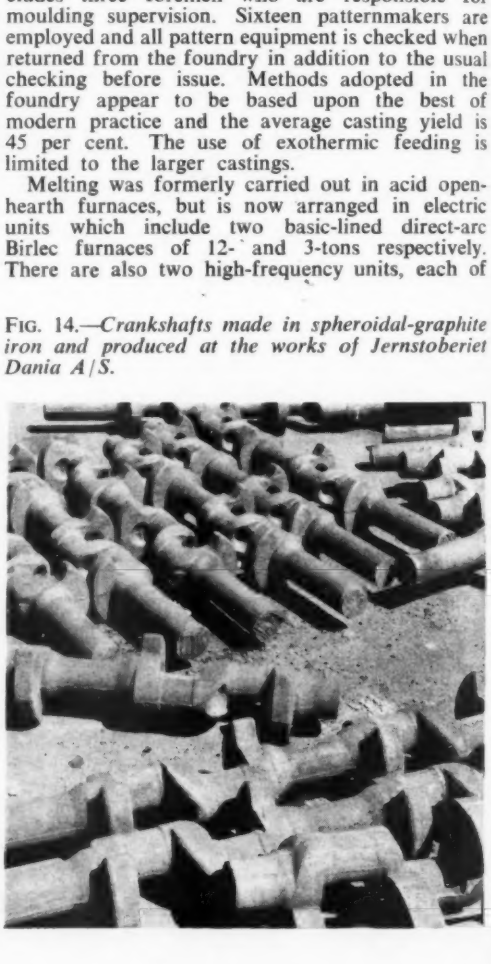
Approximately 8,000 tons of steel castings are produced annually—65 per cent. being of plain carbon steels, and the remainder heat-resisting, corrosion-resisting and abrasion-resisting steels. A limited amount of abrasion-resistant cast iron is also made. A very wide range of castings is in production, for mining, marine, railway and general engineering applications. Items of particular interest to the visitors included 12 to 14 per cent. chromium-steel propellers, up to 14-ft. dia., heat-resistant steel chain, and a variety of castings notable for their complex design.

Plant and Processes

Approximately 500 people are employed in the works, of which 200 are engaged in the foundry. The foundry methods-team—six men strong—includes three foremen who are responsible for moulding supervision. Sixteen patternmakers are employed and all pattern equipment is checked when returned from the foundry in addition to the usual checking before issue. Methods adopted in the foundry appear to be based upon the best of modern practice and the average casting yield is 45 per cent. The use of exothermic feeding is limited to the larger castings.

Melting was formerly carried out in acid open-hearth furnaces, but is now arranged in electric units which include two basic-lined direct-arc Birlec furnaces of 12- and 3-tons respectively. There are also two high-frequency units, each of

FIG. 14.—*Crankshafts made in spheroidal-graphite iron and produced at the works of Jernstoberiet Dania A/S.*



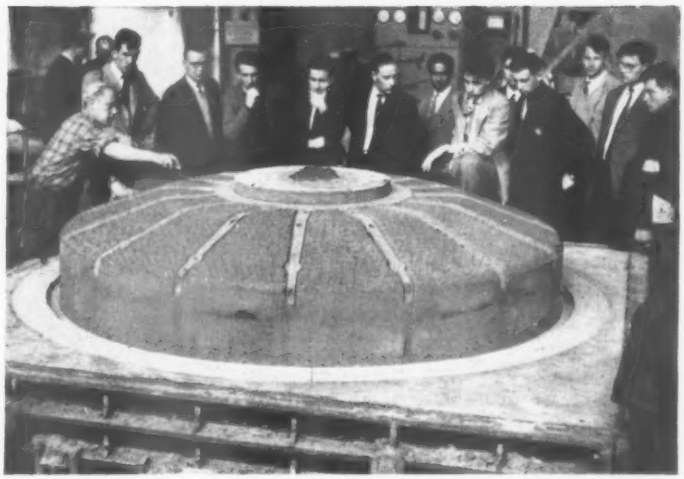


FIG. 15.—*Not a celebration "cake," but a mould inspected during preparation, by a visiting group of students from the National Foundry College in the hand-moulding section of A/S Varde Staalverke.*

1-ton capacity, one of which is basic lined. A two-slag melting practice is established in the arc furnaces, a typical heat time for the 3-ton unit being one hour, as compared with 2¼ hr. for the larger furnace. All-scrap charges of steel are generally used, with the addition of up to 10 lb. per ton of crushed electrodes. Oxygen lancing may be used to start the "boil" in plain carbon-steel production and is always used when alloy steels are made. An excellent fume-extraction plant is linked to the arc-furnace installation. Graphite consumptions reported were 6-lb. per ton and 9-lb. per ton for the small and large furnaces respectively. It is interesting to record that some Chinese-made electrodes have been tried at these works and found to be satisfactory. The ferro-alloys used are mainly of Scandinavian origin, but some supplies from Russia were available. Refractory consumption was modest and an average silica brick roof-life was quoted as 250 heats; magnesite hearths were regarded as quite satisfactory.

Castings are made which range from a few pounds to 11-tons finished weight (Fig. 15), green-sand methods being used for castings up to 9 cwt. and drysand techniques applied to larger work. Up to 0.5 per cent. of ferric oxide is added to the sand for large moulds and cores. Local sea sands are not regarded as suitable for steel moulding and sand is therefore imported from southern Sweden for the purpose; a proprietary German bonding clay is used to prepare this synthetic sand, which is used for all moulds except those intended for manganese-steel castings. Norwegian olivine sand is used for the latter purpose and costs approximately 50 per cent. more than ordinary moulding material. Sand preparation here is carried out in a fully-automatic plant of German design.

A well-designed mechanized section has been established at the works and in this section snap-flask machines are used for small work. In a six-stage production line centred on a Sandslinger, a team of 19 semi-skilled men are producing moulds for 170 tons of castings weekly. It is estimated that this is equivalent to 35 man/hours per ton excluding melting and cleaning. Two small high-frequency melting furnaces are located nearby to furnish the metal required for these moulds.

In the coreshop, a Hydraslinger unit, in combination with four Westin & Backlund turnover machines, maintains a very high core-production rate. The fettling area is located outside the main foundry buildings. All manganese-steel castings are provided with knock-off heads and some other types of castings also have their feeders removed in a similar fashion. Grinding is done indoors and a sizeable installation, comprising four medium-sized and one large oil-fired furnace, is available for heat-treatment.

Job evaluation is practised on a substantial scale throughout the foundry. In the melting section, for example, a new recruit is given a basic wage which is reviewed at the end of three, six and 12 months, and then after three, and finally after five years' service. The variety of castings made makes it imperative that regular testing and control be carried out; X-ray and gamma-ray testing are also used as a control in methods engineering for the foundry production.

Acknowledgment

Through the medium of this JOURNAL, the party's individual and collective thanks are repeated to the managements and personnel of the Danish foundries who arranged the tours and dispensed so much hospitality.

No doubt also readers will wish to have recorded their appreciation of the information made available through the courtesy of the Danish founders and this is linked with the Editor's own gratitude for permission to publish the report and for the use of illustrations.

Commander E. G. SUTTON, M.I.MECH.E., R.N. (RTD.), has been appointed works director of Sir W. H. Bailey & Company, Limited, Albion Works, Patricroft, Manchester.

Mr. T. R. CRAIG has been appointed managing director (sales), and Mr. R. R. TOWNDROW, managing director (works) of Colvilles, Limited. Sir ANDREW MCCANCE will continue as general managing director.

Hand-holes for Coreboxes

By "Checker"

When a large number of cores is required from a corebox of the frame type, it is essential that the outside should not be damaged by rapping to such an extent that extensive repairs or replacement have to be instituted before the required number of cores has been produced.

To avoid this, it is always advisable to screw a batten on at each end of the frame for rapping purposes, and so protect the ends. Then, if these battens are made of sufficient thickness to protrude about ¼ in. beyond the frame ends, extra protection will be provided. These end-battens are, however, in some instances, a source of trouble to the coremaker, for when he has turned over the corebox and wants to withdraw it from the core, he has difficulty in obtaining a suitable hand grip. However, the matter can easily be remedied by the pattern-maker, if, when making the battens, he cuts away sufficient wood to form suitable hand-holes, as shown in Fig 1(*a*). Another way is to make these end-battens of such a width that when fixed in position they are at least ¼ in. from the frame top. This will leave adequate space to get the fingers under when withdrawing the corebox from the core, as illustrated in Fig. 1(*b*).

With coreboxes that have been made out of the solid wood, assistance can be given to the coremaker when necessary by screwing on two pieces of wood—one at each end, as shown in Fig. 1(*c*)—for both rapping and lifting purposes; the essential finger-space must of course be allowed. In the event of these battens having to be replaced, they can be renewed and the frames returned to the coreshop in a very short time, with little loss to production.

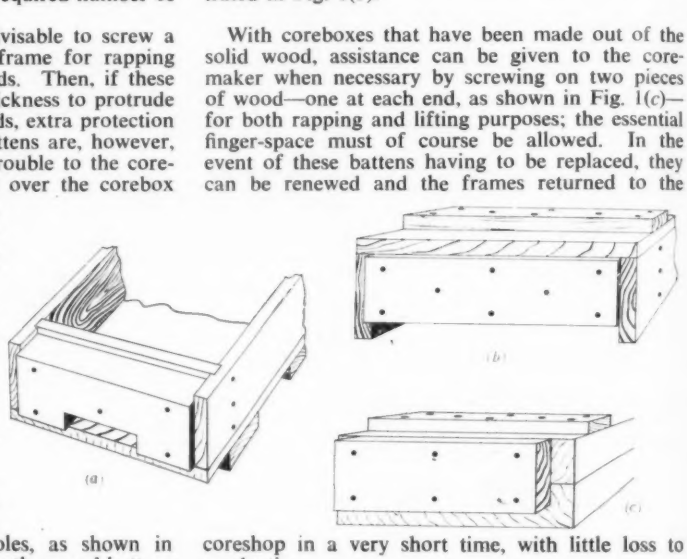


FIG. 1.—*Three ways in which protective end-battens with hand-holes can be attached to frame-type coreboxes.*

"Scruffy" Little Works the Happiest?

"There are thousands of scruffy little factories where 10 men work together far more happily than if they were all herded together in a slap-up place with all modern conveniences attached." Apprentices at the eleventh annual conference organized for them by the Industrial Welfare Society were told this last week by Mr. Peter Runge, managing director of Tate & Lyle, Limited. He believed that it was an impossible task to make the card index and the works handbook do the job of the personal contact and word-of-mouth instruction.

Attention was being directed, Mr. Runge said, towards developing techniques of management which would produce in large concerns the happy atmosphere of the smaller unit. "I would rather see the attention directed towards the small unit," he said. Mr. Runge also criticized the use of computers for office routine. "Office routine is inhuman enough already," he declared, "so we had better be on our guard when it gets into the hands of moronic computers lest we are brought unwittingly one stage nearer the ant."

RAILWAY SLEEPERS have been produced for the first time by the Durgapur Steelworks. The plant, built by Davy & United Engineering, Limited, was designed to produced sleepers for both broad- and metre-gauge railways.

"Cut-throat" Competition in the Foundry Trade

Severe competition in the foundry trade was referred to at a sitting of the Northern Area Licensing Authority for Goods Vehicles at Stockton-on-Tees recently. Supporting an application by Williamson (Haulage Contractors), Limited, for permission to use a flat-bed lorry and an articulated vehicle, Mr. A. Moore, manager of Harrison Bros. (England), Limited, said that unless a foundry could deliver goods ordered late in the afternoon on the following morning it might lose the contract. The practice of late ordering, he said, was becoming too prevalent.

Granting the application, the chairman of the authority, Mr. J. A. T. Hanlon, however, described the system as monstrous. It meant, he said, sending lorries "tearing through the night" when, with a little forethought, the customer could have obtain the goods easier by rail. It was a case of cut-throat competition, he said. If one firm refused to carry out the work, someone else would.

VICKERS-ARMSTRONGS (ENGINEERS), LIMITED—Lt.-Cmdr. R. B. Lakin has been appointed a director, and general manager of the company's North-East works in succession to Mr. J. R. Kelly who is retiring.

Equipment and Supplies

De-misting Cabinet and Safety Spectacles

Hadley Company, Limited, Portsmouth Road, Surbiton, Surrey, have produced a lens-cleaning and de-misting cabinet for the treatment of safety spectacles and goggles. The cabinet is constructed in sheet-metal and overprinted with instructions for use. It contains a simple-to-use press-top atomizer spray-canister, the contents of which it is stated will treat over 500 safety spectacles or are sufficient for the use of one worker over a whole year. One extra spray-top canister is included with the complete unit. In the cabinet also are two cartons of 72 pieces of two-ply paper polishing-tissues. The problem of eye safety and the cleaning and de-misting of lenses has engaged the company for some time, and the company believes that if founders introduce this unit (which can be placed conveniently on a wall), employees will more-readily accept and wear safety spectacles and goggles provided. In the past, one of the quite real objections to the wearing of eye-protective equipment has been that lenses "mist-up," as in many foundries conditions exist which cause "fogging" of lenses and in others, the mere fact of passing from a cold into a warmer atmosphere can cause the "misting-up" of lenses, and this could be dangerous. By introducing the cabinet referred to, Hadley Company, Limited, believe they have found a solution to the problem.

Safety Spectacles. The same company have also recently introduced a model of safety spectacles incorporating laminated safety lenses which have a dyed inter-layer, two-thirds green and one-third clear. Such lenses can be fitted with the clear portion at the top or the bottom of the spectacle frame. With normal tinted lenses, workers are tempted to remove their spectacles when they have finished any work which calls for protection from glare and to continue with other work—which may still require protection from flying particles—without wearing goggles. The two-colour lenses can be glazed to any of the extensive range of industrial safety spectacles which are available, including frames with leather, green, clear and smoke-grey acetate side-shields. Most frames are manufactured in three nose-bridge and temple measurements.

Loader

A new tractor-loader manufactured by Allis-Chalmers is now available in this country through Mackay Industrial Equipment, Limited, Faggs Road, Feltham (Middx).

Some of the features of the new machine, the TL. 16 D, are four-wheel drive and a complete power shift transmission with a 3.5 to 1 single-stage hydraulic-torque-converter drive which, it is claimed, multiplies engine torque up to 350 per cent. An Allis-Chalmers 104-h.p. 4-cylinder diesel engine provides the power. The TL. 16 D has three speeds in both forward and reverse with a top speed of 27 m.p.h. It is stated that shifting into any speed is made easy by the Allison power shift transmission and hydraulic clutches.

Power steering and four-wheel power brakes are provided, and there is a separate positive parking brake fitted to the transmission output shaft. Bucket capacities range from 1¼ cu. yd. to 4 cu. yd., all of which are based on a 7,000-lb. carrying capacity and a lifting capacity of 17,000 lb. Dumping height of the new loader is 9 ft. from the cutting edge of a 2-cu. yd. standard bucket tipped at 45 deg. with a 3-ft. ½-in. reach.

Chipping and Scaling Hammer

A pneumatic chipping and scaling hammer, known as the CP-455-L, has been introduced by the Consolidated Pneumatic Tool Company, Limited, of 232, Dawes Road, London, S.W.6. Designed to meet the need for a lightweight yet powerful tool, the hammer is also said to be suitable for chipping stone-like material and for carving wood. Clearance of chippings from the workpiece is catered for by a jet of high-velocity air which may be directed downwards, thus enabling the chisel point to be kept clear. A new type "pulley valve" is reported to give a smooth throttling action which enables accurate control to be made of the speed and power of the hammer, this being by a lever-type throttle.

The standard chisel supplied with the tool is an angle scaling chisel, although a narrow blade chisel is available if required. The chisels are held in the hammer by a positive retaining device and cannot rotate, changeover being effected by a simple quick-release clip. The net weight of the tool is 4½ lb. and the overall length is 10½ in., the size of the air inlet thread being ¼ in.

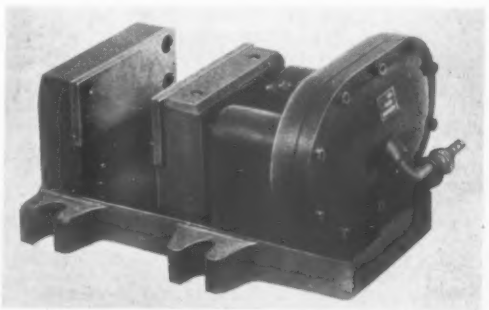
Pneumatic Vice

B. O. Morris, Limited, Briton Road, Coventry—sole UK agents for "Grasso" pneumatic tools made in Holland—announce the introduction into this country of a new air-vice, known as the M.12 (Fig. 1). A feature is that the jaws cannot close on the operator's fingers, since the actual pneumatic movement is $\frac{1}{10}$ in. The vice is easily set to the size of the component and the pneumatic ram then grips it with a force of over ½ ton; the jaws are 4¾-in. wide and the maximum gap is 5 in. Operation of the vice is effected by a foot valve (from which the exhaust air can be piped up to the jaws to act as a swarf blower). The makers claim that this vice is invaluable for drilling, milling and other machining where a flow of identical work-pieces are being handled, since it facilitates quick loading and unloading, while affording a very secure and constant pressure-grip.

Wear-resisting Rubber

A Chicago foundry owner has fitted special-rubber lining plates to heavy-duty ductwork, claiming that the rubber outlasts the abrasion-resistant alloy-steel plates previously used. Each month, some 65 tons of

FIG. 1.—*"Grasso" M.12 air-vice for drilling, milling and trimming operations. (B. O. Morris, Limited.)*



Equipment and Supplies

sand, used for foundry cores, are blown through ductwork leading from the drying units at the Elizabeth Street Foundry Company in Chicago. Formerly, at two right-angle bends in the line, the man-made "sandstorm" cut through the ¼-in. mild-steel ducting in about a month. To avoid frequent shutdowns for repair, special abrasion-resistant alloy-steel wear-plates were welded on at the elbows. These lasted longer, but still required replacement after two months.

A Chicago manufacturer of abrasion-resistant products suggested the use of "Adiprene" urethane rubber—a new rubber developed by the Du Pont Company and reported to combine hardness, resilience and load-bearing capacity, as well as resistance to abrasion, oxygen, ozone, oils and grease. Wear-plates fabricated from this material were bolted in and inspected periodically and at the end of three months, the report was "the surface shine is not even worn off." At the end of six months, it was reported, after a service life five times that of mild steel and 2½ times that of special alloy, the liner was finally found to be worn through. During the period, 380 tons of hot sand had passed through the duct, and possibly as many as five shutdowns for repairs had been saved, plus the cost of welding steel plates to the elbows.

Surface-roughness Comparator

Designed to meet requirements of a surface-roughness measuring instrument which is simple and inexpensive enough to be used in the workshop, Rubert & Company, Limited, Demmings Road, Councillor Lane, Cheadle, Cheshire, are now producing a pocket-size unit.

It consists of a sensing head in the form of a pivoted wheel made of special alloy, connected to a dial indicator and retained in the zero position by a spring. To assess the finish of any particular surface the sensing wheel is moved repeatedly to and fro across the surface. The friction between the surface and the sensing wheel causes the wheel to rotate, moving the pointer over the scale and tensioning the spring until such time as the spring tension balances the frictional drag and the wheel ceases to rotate. The indicator reading is retained by a ratchet and pawl and the surface finish can be read directly from the dial which can be calibrated in either CLA or maximal-depth units. It is claimed that the unit can also detect and locate the position of flaws, scratches and other surface imperfections.

Coating of Aluminium

The Pyrene Company, Limited, Great West Road, Brentford, Middlesex, announce that a new range of treatments for aluminium and aluminium alloys has been introduced. The range comprises, Bonderite 710, 701, and 740, and Aluma Etch 391—a controlled alkaline etchant. The Bonderizing techniques represent a low-temperature method of coating aluminium and convert the aluminium surface into a thin amorphous oxide/chromate coating which is integral with the metal itself. The coatings, it is claimed, offer good corrosion protection to aluminium and its alloys. Bonderite 710 coatings are of an attractive golden colour, the 701 process gives a pleasant green, and the 740 treatment provides a coating which is both a base for organic finishes and a corrosion-resistant film in its own right. Aluma Etch is a scale-free, controlled alkaline aluminium etchant for uniformly etching the surface of aluminium in an immersion bath.

Abrasive Testing

Considerable interest has been shown in the machine for the testing of abrasives for blast-cleaning which was illustrated in the annual report of the British Steel Castings Research Association and reproduced in the FOUNDRY TRADE JOURNAL of July 28, 1960, page 107. For the benefit of enquirers, it is now reported by BSCRA that the construction of this machine is based upon a design described by E. Bickel (*Stahl und Eisen*, **76**, (17), August 23, 1956). A machine of essentially similar design, but incorporating additional refinements is commercially available and is manufactured by Georg Fischer, Limited, of Schaffhausen, Switzerland.

Beryllium Monitor. It is claimed for a beryllium monitor designed and developed by Mr. M. S. W. Webb, Mr. R. J. Webb and Mr. P. C. Wildy, of the United Kingdom Atomic Energy Authority's Woolwich Outstation (and manufactured and marketed by Winston Electronics, Limited, Shepperton, Middlesex), that it is the most accurate and rapid instrument yet made. It is essential to the health of persons employed in foundries and other shops using beryllium, its ores and alloys, that the beryllium concentration in the atmosphere should not exceed 0.000,002 gm. per cub. metre of air. The new "4W" monitor for the detection of beryllium aerosols is said to record on a graph every 60 sec. the beryllium content of a fresh sample of the atmosphere in which the instrument is present. Sudden, or unexpected increases in beryllium concentration are quickly indicated with the new instrument and the unit can give quantitative results over the range of from 0.000,001 to 0.000,075 gm. per cub. metre, irrespective of the particle size or chemical composition of the beryllium atmospheric dust. The 4W monitor uses a.c.-mains electricity of normal voltages and frequencies and consumes 2.5 kw. The sampling head is 19 by 10 by 11 in. high and the "console" 21 by 24 by 54 in. high, the respective weights being 56 and 225 lb.

Nozzle for Spray Guns. Four new air nozzles for use with their L.540 and L.1900 spray guns are announced by Alfred Bullows & Sons, Limited, Long Street, Walsall. Of these the 63 PH2 nozzle has been developed by the company in conjunction with the Binks Manufacturing Company of Chicago, for spraying acrylic resins; model 66Pd is a tangential nozzle which provides a very wide spray; and the third nozzle, the 66SD, is designed for use with the suction feed set up. The fourth nozzle in the range is the 68PM which is a mistless nozzle, intended for use under conditions calling for low-pressure spraying.

Floor Tiles. Jaconello, Limited, Central Avenue, West Molesey, Surrey, have introduced a line of hydraulically pressed floor-tiles under the trade name "Granazzo." Measuring 16 by 16 by 1½-in. thick, they are available either in non-slip or smooth-finished types and the choice of colours available includes red, buff, grey and marigold. An advantage claimed for these tiles in place of monolithic granolithic flooring is that they are free from lifting, breaking up or dust production.

THOMAS W. WARD, LIMITED are to break up yet another tanker at their Firth of Forth yard. This is the 8,102-ton Clavella, owned by the Dutch Shell group, which has been bought by the B.I.S.C. (Salvage), Limited. The vessel was built at Rotterdam in 1939.

Internal Defects in Steel Castings . . . .

. . . . their Origin and Ways to avoid Them

In a paper contributed to the recent symposium on "Internal Steel Quality and Methods of its Assessment" organized by the West of Scotland Iron and Steel Institute, J. Cameron, B.Sc., Ph.D., and J. Courtney, both of whom are associated with the Clyde Alloy Steel Company, Limited, reviewed steel-casting practice, noting the defects which may arise and the ways of avoiding them. They discussed causes of the main classes of defect, mechanism of solidification, gas inclusions, and variations in deoxidation practice. Detection of defects was also briefly treated, but is excluded from this summary of the paper, which as it stands might usefully be regarded as supplementary to the Russian article published in the September 8 issue of the JOURNAL.

Production of a sound steel casting involves the pouring of good quality liquid steel at the correct temperature into moulds properly made from suitable refractory material and with the running system so designed and proportioned that the molten metal fills the mould cavity with the minimum of turbulence and mould erosion. In addition, the disposition and dimensions of the feeder heads must be such that all shrinkage occurs in them and not in the casting. In many instances these individual requirements are mutually incompatible. Thus bottom-gating, which minimizes mould erosion, produces temperature gradients that are the opposite of those required for optimum feeding. In many ways, therefore, the production of castings has to be a compromise between conflicting technical requirements. Economic factors must also be considered.

In view of the technical difficulties involved, it is apparent that even with stringent control, castings may contain internal defects. It is the purpose of this paper to discuss how and why these defects arise, and the practical steps that can be taken to minimize or eliminate them.

Defects Due to the Mechanism of Solidification

As steel solidifies as a solid solution, it does so over a range of temperature. Also, like most metals, there is a contraction in volume on changing from liquid to solid. Solidification at any point in a casting is initiated when the metal at that position reaches the liquidus temperature; but solidification is not completed at that point until the solidus temperature is reached. Solidification can be represented as an advancing front of dendrite tips growing towards the thermal centre, followed, after a time lag, by an advancing wave of completely solidified metal. The time between start and end of freezing can be considerable so that it is possible for solidification to have just started at the section centre and to be completed only for a thin zone near the mould/metal interface. Thus, in the later stages of solidification of a section, liquid metal may be present in the central core and also in the interdendritic spaces. As the interdendritic liquid solidifies, there is a contraction in volume and the supply of liquid must be replenished from the central pool of liquid metal, which, in turn, draws metal from the externally provided reservoir or feeder-heads.

Shrinkage

With continuing solidification, the interdendritic passages become more and more restricted so that feeding becomes progressively more difficult. Even with a plentiful supply of feed metal its ferrostatic pressure may be insufficient to force liquid into the smaller interstices of the dendrites. This gives rise to the formation of very small dispersed cavities known as microporosity. When the flow of feed metal from the riser is cut off before freezing of the section is complete, sufficient liquid metal may be present in the core to fill up the main interdendritic channels but this will be done at the expense of the central pool of metal. In these conditions, small dendritic-type cavities may be formed, known as centre-line or filamentary shrinkage. With very poor feeding conditions a gross void or shrinkage cavity may be formed.

Heat Gradient

It will be seen, therefore, that to produce castings free from shrinkage, it is necessary to control the rates of solidification at various positions along the section so that a tapered feed-channel is produced, with its wider end towards the feeder-head. This controlled directional solidification is achieved by ensuring that pronounced thermal gradients exist from the furthest point of the casting to the feeder-head. In parts of uniform cross-section fed with a riser at one end, rapid solidification occurs at the other end where heat transfer is promoted by the extra cooling face, the so-called end effect. Solidification is delayed at the riser end because of the heat reservoir provided by the head. In short lengths, a steep thermal gradient conducive to good feeding is thereby produced. As the section length is increased, a zone develops which is outside the influence of the end and riser effects and in which, therefore, there is practically no thermal gradient. The feed-channel in this zone, instead of being tapered, has parallel sides, so that over a considerable length the metal reaches the final stages of solidification at the same time. This means that feeding can take place only through

long restricted channels. These often become blocked and the resultant lack of feed metal gives rise to centre-line shrinkage.

Experimental work done on simple shapes by Pellini has shown that for plate-like sections a thermal gradient of 1 deg. to 2 deg. F. per in. is required to produce freedom from centre-line shrinkage. Bar-shaped castings require much steeper thermal gradients, namely, 6 deg. to 12 deg. F. per in. to eliminate this defect.

Corrective Measures

Prevention of gross shrinkage cavities, where lack of feeding is due to riser deficiency, is usually achieved by increasing the solidification time of the riser. The most obvious way to do this is by increasing the riser diameter, but sometimes there are practical difficulties in doing so. Alternative methods of delaying the freezing of risers are (1) later additions of hot metal, (2) exothermic additions to the top of the riser, (3) the use of exothermic sleeves, and (4) electric arc hot-topping.

The first method is self-explanatory and the important factor is the correct time of the hot-metal additions. The top additions in the second method vary from the mildly exothermic materials such as blacking and chopped straw to the strongly exothermic "Thermit" type of compound. These materials usually have a high ash content and after combustion they form an insulating layer. The exothermic sleeves are moulded from a mixture of sand, iron oxide, and finely divided aluminium together with a bonding agent. In the fourth method, the freezing of the head is delayed by the heat provided by an electric arc struck between the liquid metal in the head and a graphite electrode. This method is usually applicable only to large castings fed with a single head.

Microporosity which occurs as small dispersed cavities is difficult to detect. Possibly it is produced by the combined effects of shrinkage and dissolved gases, but its mechanism of formation is not fully understood. Important factors in its control are to ensure the best possible feeding and metal of low gas content. Even with these precautions, all heavy sections contain this defect to some degree, but with slight microporosity the impairment of mechanical properties is negligible.

Defects Due to Gas

The delivery to the mould of metal with the minimum gas content is essential for the production of sound castings. Although it may be produced with a low gas content, metal is poured into sand moulds containing moisture and organic materials that give off gas. Also, the first metal to enter the mould cavity may do so in a turbulent manner. The resultant intimate mixing of gas and metal is conducive to gas pick-up. As solidification occurs, the gas segregates in the liquid phase until the solubility limit is exceeded, with the resultant production of gas bubbles that are enlarged as more gas is evolved from the solidifying metal. This defect varies greatly in its distribution in the casting. Some portions may be completely free while other parts show very severe blowholes. This is in contrast to the effects of a "gassy" steel, where the gas content is high due to bad steelmaking practice. In this case, the blowholes are usually smaller and are more uniformly distributed throughout the casting.

Pinhole Porosity

A particular type of defect caused by gas is known as pinhole porosity. It occurs sporadically with steel cast in green-sand moulds. The holes originate below a skin of sound metal and are elongated at right angles to the mould wall. They are similar to rimming holes in rimming steel ingots, but in castings they occur with fully killed steel. It has been found that the addition of a strong deoxidizer such as aluminium usually prevents the formation of pinholes and this has given rise to two main theories to explain their mechanism of formation. The first theory is based on the premise that when steel is poured into a green-sand mould the following reaction occurs:

$$Fe + H_2O \rightarrow FeO + 2H$$

The atomic hydrogen diffuses readily through the skin of solid metal to the solid liquid interface, where it reacts with dissolved FeO to form a bubble of water vapour. This bubble acts as a nucleus into which diffuses the gas segregated in the liquid layer immediately ahead of the solidification front. As the solidification front advances, the bubbles become elongated in the direction of wall growth. The chief objection to the hydrogen theory is that even with a dissolved hydrogen content of 15 parts per million and a steel saturated with oxygen, the pressure would be insufficient to nucleate a bubble of water vapour.

The second theory is based on the suggestion that due to the breakdown of moisture at the metal/mould interface, the oxygen content of the metal is locally increased to such a level that there is insufficient deoxidizer present. The excess oxygen reacts with carbon to produce a bubble of carbon monoxide. In the case of carbon/oxygen reaction it has been calculated that a steel containing 0.30 per cent. carbon and saturated with oxygen generates a carbon monoxide pressure of 32 atms., a value high enough to nucleate a bubble. The theoretical objection to this is that in the presence of strong deoxidizers the oxygen content can never be sufficiently high. However, it is possible that a local concentration of oxygen might be produced by the decomposition of moisture at the mould/metal interface.

Both theories have their strong adherents. However, the truth perhaps is that all the gas-forming reactions must be taken into consideration. Some support is given to this view by the fact that in high-chromium steels nitrogen appears to be as potent a factor in the formation of porosity as is hydrogen.

Corrective Measures

While full agreement on the mechanisms of formation of pin-hole porosity has not yet been

reached, the following practical precautions do seem to minimize the occurrence of this defect:—A good vigorous boil; minimum refining period; thorough and correct deoxidation with aluminium; well dried ladles; moulds of high permeability and with a controlled low-moisture content.

Apart from these well-established methods of producing steel of low gas content, some mention may be made of two newer techniques devised to reduce the hydrogen content of metal. The first method consists of treating the steel by plunging moulded blocks of tetrafluorethylene (Fluon) into the liquid metal. This compound dissociates to liberate fluorine gas which removes the hydrogen partly by chemical combination and partly by a physical flushing action. While this treatment is claimed to reduce hydrogen content by 50 per cent. practical trials indicate that such efficiency of hydrogen removal is obtained only in those instances where the steel has a high initial hydrogen content. With steels of normal hydrogen content the effectiveness of the method is very much reduced.

The second method utilizes refractory sleeves containing a carbonate. These sleeves are fitted round the ladle stopper-rod. The carbonate decomposes on contact with the liquid steel to produce a violent and prolonged "boil" which physically flushes out any hydrogen. On limited trials, this method showed promise of being a practical and effective method of reducing the hydrogen content.

Defects Due to Deoxidation Practice

Aluminium is widely used in the steel-casting industry as a final deoxidizer, as it is the most effective agent for the prevention of pinhole porosity. However, in certain circumstances its use can have adverse effects on the quality of castings. As these adverse effects manifest themselves as an impairment of the physical properties rather than in the form of any physical discontinuity or void, it is not possible to detect them by any non-destructive method. Unlike the void type of defect, these undesirable features once formed cannot be removed or rectified, consequently it is essential to take all possible precautions against their formation.

The impaired metal quality can arise from two separate and distinct phenomena:—(1) Grain-boundary sulphides; (2) inter-granular fracture or, as it is sometimes called, "rock-candy" fracture.

Grain-boundary Sulphides

It is found that in most cast steels, the indigenous inclusions are predominantly sulphides, as the oxygen content is usually less than 0.020 per cent., while the sulphur content averages 0.030 per cent., and may be as high as 0.050 per cent. in acid steel. When a melt of steel is deoxidized with aluminium, the quantity of deoxidizer used has a considerable effect on the form, size, and distribution of the sulphide inclusions, and that, in turn, may have a pronounced effect on mechanical properties. Dependent on the final deoxidation practice, sulphide inclusions in cast steels can occur in three distinct forms which have been classified as shown below.

The first, known as Type-I, are usually globular in appearance and randomly distributed. They are characteristic of steel deoxidized with aluminium in amounts less than ½ lb. per ton. Steels with normal sulphur content present in this form have good mechanical properties. The second, or Type-II, sulphides are small and globular, but tend to be dispersed in a chain-like arrangement around the as-cast grain boundaries. In extreme cases, where the sulphur content is high, they may form continuous films. Type-II sulphides are the characteristic form in steels treated with ½ to 2 lb. of aluminium per ton, an amount which is just sufficient to ensure complete deoxidation, but is insufficient to leave any residual aluminium in the steel. When the sulphides occur in this form, the ductility and impact resistance are reduced and the tendency for the formation of hot tears and cracks is increased. These detrimental effects become less apparent as the sulphur content of the steel is progressively reduced. Type-III sulphides are irregularly shaped, randomly distributed, and tend to be larger than Type-II inclusions. They are characteristic of steel deoxidized with more than 2 lb. of aluminium per ton. While the mechanical properties are not as good as those obtained with Type-I, the impairment is only slight.

One explanation of the effect of aluminium deoxidation on the dispersion of sulphide inclusions is based on the premise that dissolved oxygen reduces the solubility of sulphides in steel. Thus, a steel deoxidized with small additions of aluminium will have a high dissolved oxygen content and the sulphides will precipitate early during solidification. With intermediate amounts of aluminium, the oxygen content will be low and the sulphides will precipitate at the last positions to solidify, that is, the grain boundaries. With excess aluminium present, complex (Fe/Mn/Al) sulphides of low solubility are formed and these also precipitate early.

Corrective Measures

From the foregoing discussion, it can be seen that to avoid the formation of detrimental Type-II sulphides, aluminium additions must be either less than ½ lb. per ton or more than 2 lb. per ton. In most instances the larger quantity is used. It has been established, however, that aluminium is objectionable in steels for high-temperature service as it promotes graphitization and reduces creep resistance. Indeed, some specifications for creep-resisting steel castings stipulate a maximum aluminium addition of ½ lb. per ton. With this smaller amount of deoxidizer the danger of pin-hole porosity becomes more acute and the production of castings free from this defect requires careful control over metal and mould quality.

While this problem has been discussed in terms of the amount of aluminium added to the steel, it is obvious that the important factor is the amount of residual aluminium retained in the steel. It

is therefore important that the aluminium additions should be made with the utmost care to ensure maximum efficiency; and that aluminium determinations should be regularly carried out to ascertain what recovery is being obtained. Where teeming times are prolonged, checks should be taken at intervals to ascertain if any "fading" is taking place.

Intergranular or "Rock-candy" Fracture

This defect, as its name implies, is revealed when the steel is fractured and manifests itself as a very coarse matt grey fracture with large facets. While not affecting the strength properties, it produces low elongation values in the tensile test, together with very poor impact properties. In addition, in extreme instances it may cause severe cracking of castings as they cool in the moulds. It is confined to steels deoxidized with aluminium and is accentuated by slow cooling from the casting temperature such as occurs with a heavy section.

Investigations have shown that one of the causes of inter-granular fracture is the precipitation of aluminium nitride at the austenite grain boundaries. As this precipitate is seldom visible under the microscope, this conclusion was deduced from the fact that susceptibility to intergranular fracture increased with increasing aluminium and nitrogen contents, and that intergranular fracture can be eliminated by air cooling from 1,250 deg. C. At this temperature aluminium nitride is soluble in steel and a relatively fast rate of cooling prevents reprecipitation at the grain boundary. Additions of zirconium and titanium, which have a greater affinity for nitrogen than aluminium, also prevent the intergranular fracture.

Corrective Measures

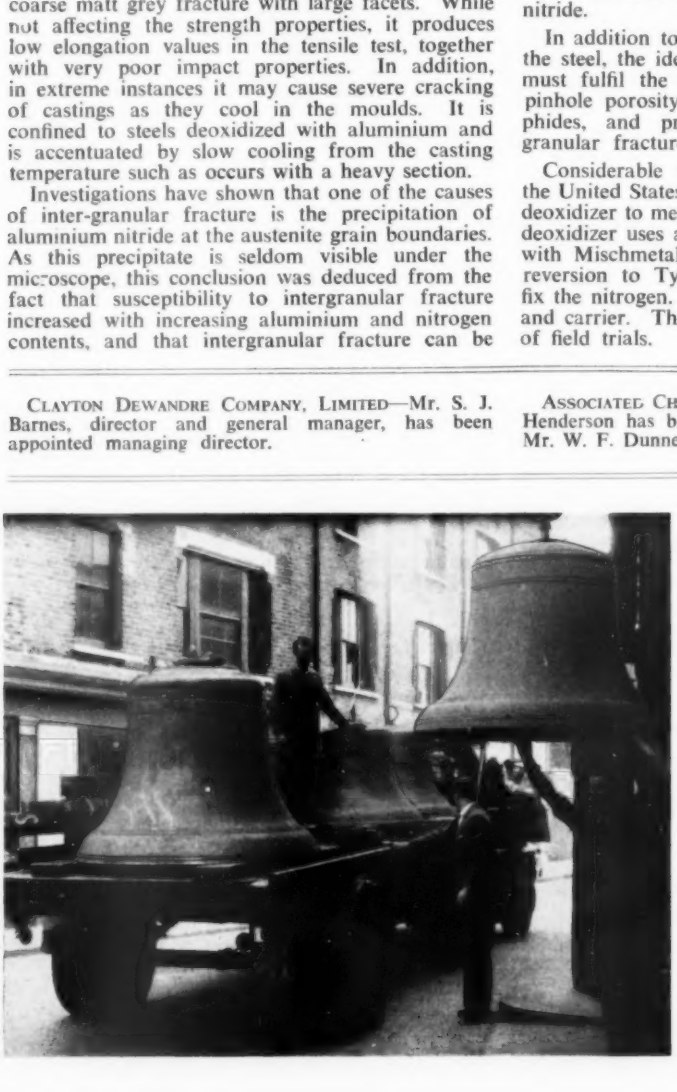
As intergranular fracture is a function of nitrogen and aluminium contents, the methods for its control are the production of steel with a low nitrogen content, and the addition of elements such as titanium or zirconium to fix the nitrogen as harmless discrete particles of titanium or zirconium nitride.

In addition to controlling the oxygen content of the steel, the ideal deoxidizer for steelfoundry use must fulfil the following requirements:—Prevent pinhole porosity; avoid formation of Type-II sulphides, and prevent the occurrence of intergranular fracture.

Considerable research work has been done in the United States on the development of a complex deoxidizer to meet these requirements. This special deoxidizer uses aluminium as its major constituent with Mischmetall (cerium + lanthanum) to cause reversion to Type-I sulphides, and zirconium to fix the nitrogen. Ferro-silicon is used as a diluent and carrier. This deoxidizer is still in the process of field trials.

CLAYTON DEWANDRE COMPANY, LIMITED—Mr. S. J. Barnes, director and general manager, has been appointed managing director.

ASSOCIATED CHEMICAL COMPANIES, LIMITED—Mr. A. Henderson has been appointed deputy chairman and Mr. W. F. Dunnett has joined the board.



Bells Recast

The photograph alongside shows four bells leaving the foundry of Mears & Stainbank last month *en route* for St. Michael's Church, Cornhill. The bells had been cracked and had to be recast. Eight others of the twelve bells are being tuned and cleaned; the largest, the tenor bell, weighing 43 cwt., is the only one in the City of London to bear an inscription for the present Lord Mayor of London, Sir Edmund Stockdale. (The Whitechapel bell foundry (Mears & Stainbank) was established by Robert Mot, 1570.)

Other recent work includes a 4½-ton bell for Ampleforth College, Yorkshire, which is electrically swung and electrically tolled, and a ring of six bells at St. Vedast's Church, Foster Lane, London. Bow Bells, consisting of a peal of 12 bells, the tenor weighing 42 cwt., were cast by the company in 1956 and these will be hung next year on completion of the steeple.

Back from Greenland

Two boys who have been taking part in a six-week expedition to the Staunings Alps in north-east Greenland returned home with the rest of the party early this month. They were Brian Mills, an apprentice turner employed by the Stanton Ironworks Company, Limited, and Michael Collins, an apprentice fitter and turner at the company's Holwell Works. Each of the boys spent three weeks on scientific study and both agree that it was a fine experience.

MICHAEL COLLINS

On arrival in Greenland the boys were surprised to find that apart from arctic wastes, the country also boasted lush green valleys and not until they got into the Staunings Alps proper was the country glacial. Among their many memories are those of camping on a glacier at 7,000 ft., of a 220-mile trek to visit Eskimos and of cold so intense that on one occasion Michael Collins found that a knife and fork he picked up remained firmly stuck to his hand.

BRIAN MILLS

The expedition was led by Sir John Hunt and, apart from its value to science and geography, was of significant value in the service of youth. The ages of the boys who took part ranged from 17 to 20 years and all were from industry or commerce. With the boys and their three leaders were 12 experienced mountaineers and scientists and the expedition provided a pattern for partnership between older and younger people and gave an opportunity for the development of character and qualities of leadership in an uninhabited arctic setting.

All the boys who took part were holders of the Duke of Edinburgh's Gold Award and the expedition, organised under the auspices of the National Association of Mixed Clubs and Girls' Clubs (of which Sir John Hunt is joint president), was geared to the standard of the senior members of the party.

Weir-Clarke Agreement on Air-compressors

The Glasgow engineers and founders, G. & J. Weir, Limited, which was licensed last year by Clark Bros. Company division of Dresser, AG, to build Clark centrifugal and reciprocating compressors, will now also manufacture the Clark line of Isotemp packaged centrifugal air-compressors.

Designed in seven frame sizes, with capacities ranging from 5,000 to more than 50,000 cu. ft. per minute, the new Weir-Clark isotemp compressors will provide air of highest purity at a primary pressure of 110 lb. per sq. in. for tonnage oxygen plants and other industrial uses.

New Offices for Austin S. Beech & Company, Limited

About 150 members of the foundry and engineering industries assembled in Leighton Buzzard on Monday for the opening of a new office block for Austin S. Beech & Company, Limited, at Energy Works, Linslade. The proceedings commenced with a reception at the works, following which the party were entertained to luncheon at the Swan Hotel. After the loyal toast, that of the firm, coupled with the names of Tal Numatics and Foundry Equipment, Limited, was proposed by Mr. W. E. Nixon, HON. F.R.AE.S., F.C.I.S. (late chairman of the De Havilland Aircraft Company, Limited), and the presentation was made to Mr. A. S. Beech, M.I.MECH.E. (managing director of the Leighton Buzzard concern), of a ceremonial key to the new office-block. On returning to the works, the party witnessed the formal opening of the new offices, signed the visitors register and thereafter were conducted in small parties on tours of the offices and works, including also the valve-making concern (Tal Numatics); the foundry (High Grade Castings, Limited); and the shops of Foundry Equipment, Limited. Among the latter, foundrymen among the visitors were particularly interested to see various machines under construction, especially shotblast equipment and vertical-axis centrifugal casting machines, which represent a new departure for the firm. Before dispersing, the party was entertained to tea in the boardroom of Foundry Equipment, Limited.

Forty Years Ago

The September, 1920, issue of the JOURNAL was largely devoted to recording the annual meeting of the "Institution" of British Foundrymen. The membership had by then reached 1,600, with the Scottish being the largest branch and Coventry the second. Fees were raised to £2 2s. 0d. for members, £1. 1s. 0d. for associate members and 10s. 6d. for associates, but only after a good deal of discussion.

Amongst new companies registered appeared the names of the New Eagle Foundry Company, Limited, Clissold Foundry Company, Limited, Fine Castings, Limited, and Armstrong Whitworth Aircraft, Limited.

Ironfounding Health and Safety

"Ironfounding Health and Safety," an 80-page report of the Council of Ironfoundry Associations Ironfounding Health and Safety Conference, held in April at Blackpool has now been published. It gives the full text of the 10 papers presented, with summaries of the discussions, and of the discussion-group reports that formed an important and useful feature of the Conference. Copies may be had free on application to the secretary, Council of Ironfoundry Associations, 14, Pall Mall, London, S.W.1. (The Conference was reported in the JOURNAL, March 17, April 21 and 28, May 26 and July 14.)

THE PLATE MILL AT the South Durham Steel and Iron Company's new £50,000,000 works at Greatham, near West Hartlepool, was scheduled to commence production on September 5. The mill, nearly half-a-mile long, and said to be the biggest in Europe, will have an initial output of 1,000 tons of finished plate per shift and when working at full capacity will raise the company's production at its two West Hartlepool plants to 1,000,000 tons per annum.

"Sandwich" Courses

More than 10,000 students are expected to enrol this month for "sandwich" courses at colleges of advanced technology and technical colleges in England and Wales compared with just over 2,000 five years ago. This increase in the popularity of sandwich courses is indicated in a pamphlet* published by the Ministry of Education recently, which shows that the colleges will offer over 330 sandwich courses in the session beginning in September compared with just under 300 last year and about 100 five years ago. The subjects covered by the courses range from civil, mechanical and electrical engineering, to electronics, rubber technology and business studies.

The "sandwich" idea is spreading from the professional level. The new list contains a number of courses at the technician level. A separate section of the pamphlet gives details of over 40 block-release courses as compared with 25 in last year's list.

Sandwich courses consist of alternate periods of college study and industrial experience and are a distinctive product of the British technical education system where they have a long history. It is only in recent years, however, that a vigorous development has taken place. The Government is now relying on them as one of the principal means of increasing the output of scientists and technologists.

Most of the new sandwich courses are pitched at a level corresponding to that of a university degree. Nearly 100 of them are aimed at a degree or a Diploma in Technology, which is equivalent in standard to an honours degree; of these, over 50 are offered by the colleges of advanced technology. At a slightly lower level, over 100 courses lead to the Higher National Diploma, which corresponds roughly to a pass degree. A number of other courses lead to diplomas which give exemption from the examination requirements of various professional bodies.

It is characteristic of the sandwich course that it involves an integration of academic study with practical experience. This involves a close collaboration between colleges and industrial firms who together have to work out schemes of training suitable for students of university calibre who are aiming to become professional technologists.

Block-release courses consist, like the sandwich courses, of alternate periods of college study and practical training. In block-release courses, however, there is less study and more training. Education for technicians and craftsmen has hitherto taken the form almost exclusively of one day's release per week.

* "Sandwich Courses," List 182 (1960), obtainable from H.M. Stationery Office, York House, Kingsway, London, W.C.2, price 4s. 6d. post free.

British Standards Institution

In *BSI News* for September, published by the British Standards Institution, 2, Park Street, London, W.1, there is listed a new British Standard, No. 1710: 1960 Identification of pipelines, which recommends an identification colour code for the contents of pipelines in buildings, industrial installations and also for water and land transport. The colour code is based on the use of ground colours which have been selected to distinguish the various kinds of fluid or groups of fluid. Means by which pipelines can be more specifically identified either by colour bands and rings or lettering, are also recommended. The identification of long-distance mains, either above or below ground, is not included in this standard, the cost of which is 6s.

£1,000,000 Contract for Ashmore, Benson, Pease

Ashmore, Benson, Pease & Company, Limited, Stockton-on-Tees (of the Davy-Ashmore group), has received instructions from Colvilles, Limited, to proceed with the design, manufacture and erection of a third blast-furnace plant for their Ravenscraig Works. The furnace will have a hearth diameter of 26 ft. and completion is planned for October 1962. Value of the contract is in excess of £1,000,000.

Whilst the plant will be similar to the No. 1 blast-furnace which the company completed for Colvilles in 1957, and also to the No. 2 furnace which the same company is at present constructing at Ravenscraig, it is of slightly increased capacity, and will incorporate changes in the design of brick lining and water cooling, in accordance with recent trends in blast-furnace practice.

Another member of the Davy-Ashmore group, Davy and United Engineering Company, Limited, of Sheffield and Glasgow, has already reported contracts for rolling-mill plant worth well over £5,000,000 for current Colvilles development programmes. These involve not only the building of the new 68-in. semi-continuous hot-strip mill for Ravenscraig, but also a 68 in. wide 4-stand tandem cold-strip mill and a 68-in. wide single-stand temper mill for Colvilles Gartcosh Works, both of which will be processing strip produced on the hot-strip mill at Ravenscraig.

POA Conference

The first regional conference of the Purchasing Officers Association to be held in Ulster takes place at the Belfast Castle on Saturday, October 29. The formal opening of the conference by the Lord Mayor of Belfast, Alderman R. G. C. Kinahan, J.P., will be followed by an address on "Finance and Economics of Purchasing" by Dr. W. Cornish, senior lecturer, Commerce Department, Belfast College of Technology, and at the second session on purchasing organization, the lecturer will be Mr. J. M. Grammer, director general of purchasing and stores, National Coal Board and the national vice-chairman of the Association. The conference fees, which include luncheon and dinner, will be £1 1s. for members and £1 15s. for non-members. Further details may be obtained from the secretary of the Association, at Wardrobe Court, 146A, Queen Victoria Street, London, E.C.4.

New Ruling on Family Allowances

A 17-year-old apprentice can now count for family allowances if his net weekly earnings are less than 89s. 6d.; apprentices aged 16 can earn up to 87s., and those aged 15, 84s. 6d., according to a new ruling made by the National Insurance Commissioner. The Family Allowances Act covers apprentices whose earnings do not provide "wholly or substantially a livelihood," and the Commissioner has ruled that in present circumstances this means earnings up to the amounts stated. Previously the earnings limits were 55s. for apprentices under 17 and 60s. for those between 17 and 18. Parents who consider that they may be entitled to family allowances or to an increase of National Insurance benefit because of this ruling should get in touch with their local National Insurance Office as soon as possible.

Personal

West Instrument, Limited, announce that they have appointed M. DÉ MICHEL as a full-time representative in France.

Mr. J. F. H. WARNER has joined the board of George Edwards, Limited, metalworkers, 21, Bennett's Hill, Birmingham.

Mr. W. G. HUNT and Mr. A. D. GEORGE have been appointed directors of the Asquith Machine Tool Corporation, Limited.

Mr. C. A. GANDERTON, manager of the marketing department of A.E.I.-Hotpoint, Limited, has been appointed to the board as marketing director.

Colonel S. W. M. WHITEHEAD has been elected to the board of Humber, Limited, and has assumed the appointment of director of personnel for the Rootes group.

Sir LESLIE GAMAGE has relinquished his executive duties as managing director of the General Electric Company, Limited, and will vacate the chair on December 31.

Mr. C. GILBERT SMITH, who was appointed to the board of the Raleigh Cycle Company, Limited, last May to take charge of the company's motor division, has been appointed to the board of Raleigh Industries Limited.

Mr. W. A. ANKERSON has joined the board of Associated Electrical Industries (Woolwich), Limited, as assistant managing director. Mr. Ankerson will relinquish his appointment as general manager A.E.I. home district offices, and will cease to be a director of Associated Electrical Industries Overseas.

Mr. E. H. S. VAN SOMEREN has recently joined the British Welding Research Association as a principal scientific officer and is to work on fundamental studies on the physics of the welding-arc by optical observations. Since 1958 he has been in the research department of Murex Welding Processes, Limited.

Mr. JAMES HARROLD has been appointed assistant service manager of William Doxford & Sons (Engineers), Limited, engineers and shipbuilders, of Sunderland. He joined the company on leaving school, and after his apprenticeship and service in the drawing office became responsible for all engine testing.

Mr. A. R. O. WILLIAMS has been elected president of the Institution of Mining and Metallurgy for 1961-62. He will take office in May, 1961, in succession to Professor DAVID WILLIAMS. Mr. A. R. O. Williams is a director of the Consolidated Gold Fields of South Africa and its subsidiary, New Consolidated Gold Fields.

International Meehanite Metal Company, Limited, announce reorganization in their board of directors. Mr. OLIVER SMALLEY, O.B.E., has been appointed chairman of the board with Mr. P. ATTENBOROUGH as managing director. Other directors of the company are Mr. E. M. CURRIE, Mr. E. W. HARDING and Mr. G. HOBMAN.

Mr. A. G. REYERSBACH has relinquished his post as chief marketing executive of Judge Kitchenware as a result of the takeover by Jury Holloware, Limited, Brierley Hill, Staffs., of Ernest Stevens, Limited, Cradley Heath. Mr. G. M. CHANTRY, chairman, Jury Holloware, Limited, has been presented with an atmospheric wound clock to mark his 25 years' service as a director and 21 years as chairman. The presentations were made at a directors' dinner at the Grand Hotel, Birmingham.

Obituary

The death has occurred of Mr. A. JACKSON, a past-president of the Burnley section of the Institute of British Foundrymen. Mr. Jackson joined the Institute in 1925.

Mr. THOMAS GRAHAM, chairman, Thomas Graham & Sons (Iron & Steel), Limited, Lowther Street, Carlisle, has died. His father was founder of the firm, and Mr. Graham became senior partner on his father's death.

Mr. WILLIAM VANCE WRIGHT, who was general manager and a member of the board of John Brown Land Boilers, Limited, Clydebank, when he retired because of ill-health last September, has died at the age of 58.

The death has occurred at the age of 80 of Mr. EDWARD SWINNEY, chairman of Swinney Bros., Limited, engineers and ironfounders, of Morpeth (Northumberland). Mr. Swinney started his apprenticeship in 1895, joining the board of Swinney Bros. in 1923.

The death occurred last week of Mr. HAROLD TAYLOR, for 20 years chief engineering inspector of J. Blakeborough & Sons, Limited, engineers and valve makers, of Brighthouse (Yorks). On his retirement in November he had completed 40 years' service with the company.

Mr. ARTHUR DOUGLAS CLOWES, technical representative of Samuel Osborn & Company, Limited, Clyde Steel Works, Wicker, Sheffield, has died at the age of 72. During his 40 years with the firm he travelled extensively in America, Canada, South Africa, Scandinavia and the Far East.

Mr. HARRY HOUGH who for the past five years had been foundry manager of the Gothic Engineering Company, Limited, at West Bromwich, died on September 2 at the age of 67. Mr. Hough had completed over 53 years in the foundry industry and was to have retired on September 9.

Mr. FRANK D. WEBB, president of the Manchester and District Ironfounders Employers' Association, died on September 7. Prior to his presidency, Mr. Webb had been secretary of the Association for nearly 40 years and was well known in ironfounding circles. He was the senior partner in the firm of Webb, Hanson, Bullivant & Company, chartered accountants, Manchester, and held various lay appointments in the Manchester diocese.

Mr. A. C. BARLEY, employment officer at the English Steel Corporation, Limited, Sheffield, for the past 30 years, died suddenly on September 8, at the age of 64. He started as a junior clerk in the cost and accounts department of Vickers, Limited, served on a number of committees of the Sheffield and District Engineering Trades Employers' Association and took a prominent part in labour relations work in Sheffield.

* * * * *

It is regretted that in the Obituary notice for Mr. T. H. WEAVER, printed in last week's JOURNAL, it was erroneously stated that he had been foundry production manager of W. & T. Avery, Limited, at Tame Bridge Foundry, when in fact he was attached to the planning department of Avery's Soho works.

THE STANTON IRONWORKS BRASS BAND broadcast yesterday (Wednesday) evening in "The Erewash Valley" (a "portrait" of the D. H. Lawrence country) in the BBC Third Programme.

American Letter

US Gear Makers

US gear manufacturers have experienced a continued upward trend in orders this year, according to J. F. Murray, president of the American Gear Manufacturers' Association. Severe price competition has been experienced, he said, and British, Japanese, German and Italian gear makers frequently were undercutting domestic bids. In addition, "captive" American gearing shops were looking for outside markets to utilize excess capacity. The monthly shipments index of 77 leading American gear manufacturers showed business had more than doubled in the last ten years.

Mr. Murray says that gear business in 1960 will be about 5 per cent. better than 1959, and the latter was the third largest in the last 12 years. Gear manufacturers are big consumers of castings, forgings and bar stock. The principal research being done on gear materials, Mr. Murray adds, is for applications in the "aerospace" industries involving wide temperature-variation. This takes in the use of titanium, columbium and other rare-metal alloys in missile and rocket gearing.

Foundry Materials Handling Course

The (American) Material Handling Distributors' Association announce a course in "Foundry Materials Handling" to be held at the Association's National Training Centre, in Newport, Rhode Island, from September 19 to 23. In addition to lectures, the course will offer numerous discussion periods, and evening conferences where registrants will be able to discuss their own particular problems with the lecturers. Subjects of the lectures are as follow: "Foundry Industry To-day—Its Future"; "Raw Materials, Sand-handling Systems and New Developments"; "Sand Handling to a Central System"; "Versatile Approach to Varying Demands along the Moulding Line"; "Hot Processing and the Handling of Raw Materials"; "Cooling Processes and Separation of the Sand from the Product"; "Finish and Fashioning the Product"; "Special Operations for Finishing"; "Warehousing, Storage and Order Selection"; and "The Wonders of the New Age for Foundries." Further information about the course may be obtained from Mr. H. Freeman, director of the Centre, at P.O. Box 537, Newport, Rhode Island, USA.

Continuous-casting Plant for India

Distington Engineering Company, Limited, Workington, a branch of the United Steel Companies, Limited, in conjunction with their associaties Concast A.G., Zurich, are to build a vertical continuous-casting plant for steel billets, on behalf of Canara Workshops, Limited, Mangalore, India. The plant will be a single-strand unit designed to cast billets from 2- to 4-in. square, and provision is being made in the structure for the addition of a second strand. The chief qualities to be cast will be silicon/manganese steel. Liquid steel will be lip-poured from a seven-ton ladle into a tundish, feeding direct into a tubular copper mould. After leaving the spray-cooling chamber, the solidified billet—withdrawn through two pairs of withdrawal rolls—will be bent to the horizontal and later pass through a straightening device, to run out tables, where it will be cut to length. The machine will be shipped from this country in May, 1961.

Bulgarian Application of Exothermics at the Taphole

A report in a recent issue of the Sofia daily newspaper *Otechestven Front* describes a development in Bulgaria calculated to reduce the wastage of metal which occurs when tapping low-temperature material, estimated at between 40 and 50 per cent.

Inspired by Government appeals for economy in the use of metals, the foundry manager at the "Stalin" engineering works at Dimitrovo, Konstantin, Koev, together with his assistants, have studied ways and means whereby a large source of wastage, the formation of "dead-metal" when pouring molten metal into moulds, might be reduced. The problem was, how to keep the metal as tapped at a sufficiently high temperature to permit of its use. The solution supplied was the use of an exothermic mixture (of aluminium, ferrous oxide and saltpetre) which would burn at a very high temperature. Placed near the tapping hole, this mixture is ignited by the molten liquid, and by its combustion maintains the metal at a high temperature. First tests of this procedure have proved very successful, reducing the loss due to "dead-metal" by between 15 and 25 per cent., it is claimed. The report goes on to state that it is estimated that regular adoption of the exothermic process at the "Stalin" engineering works could result in an annual economy of about 2,500,000 leva (£125,000).

Shipbuilding Contractors Urged to tighten Quotations

An appeal to sub-contractors to the shipbuilding industry to prepare their quotations with the same spirit and resolve as the shipbuilders were applying to ensure that the industry would be truly competitive, was made by Dr. Denis Rebbeck, deputy managing director of Harland & Wolff, Limited, Belfast, last week. "I am firmly convinced that there is still some slack to be taken up. This is our life, our livelihood, and our future, and we must strive to secure it," he said.

Dr. Rebbeck said it would be folly to disguise the anxiety which existed because of the uncertain future for both shipping and shipbuilding. Both were subject to intense competition from abroad. On the one hand, too many ships were chasing too few cargoes, and on the other too many shipbuilders were chasing too few orders. There would have to be further economies in the shipbuilding industry to enable it to stand up to foreign competition. "We must improve output and efficiency, cost, and quality, and the effort must be sustained."

Light Metal Industry in India

To emphasize the development to date of the light-alloy industry in India and to focus attention on research and industrial development in the sub-continent the National Metallurgical Laboratory of India is organizing a symposium on the "Light Metal Industry in India" to be held early in February, 1961. The symposium will cover many aspects of light-alloys, from raw materials to heat-treatment. The rôle of these metals in the technology of nuclear reactors and the expansion of the light-metal industry in India will also be discussed. Readers who wish to attend or to present papers should write to B. R. Nijhawan, director of the National Metallurgical Laboratory, Jamshedpur -7, India.

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News in Brief

THE ANNUAL GENERAL MEETING of the British Standards Institution is to be held at 3 p.m., in the Council Room, British Standards House, 2, Park Street, London, W.1.

THE VETERAN CRUISER H.M.S. Birmingham (9,100 tons) has arrived in the Forth to be broken up at the yard of Thos. W. Ward, Limited, Inverkeithing. The vessel was built at Devonport in 1937.

THE RECEIPT of their 200th order for carbon blast-furnace linings since the first order in 1943 is announced by Carblox, Limited, of Sheffield, one of the Marshall Refractories group of companies.

PLANS BY THE DONCASTER FIRM of Peglers, Limited, brassfounders, to introduce a night shift for women, who worked for the firm when they were single and are now married, has been strongly supported, and as many women as can be used have already been engaged.

BRITISH ENGINES, LIMITED, of Newcastle-on-Tyne, have pointed out that the reference in the JOURNAL (September 1 issue, p. 279) to the company having extended its foundry storage is not quite correct. Actually a new patternshop and shell-moulding foundry have been completed.

GRUNDIG WORKS, LIMITED, the Northern Ireland subsidiary of the German firm, which five weeks ago started engaging local workers at an 18,000 sq. ft. Government-built standard factory at Dunmurry, near Belfast, now has 40 employees producing tape recorders at the rate of 120 per day.

FIELD MARSHALL SIR GERALD TEMPLER, former chief of the Imperial General Staff, was the speaker at the luncheon of the Non-Ferrous Club held in Birmingham on September 7. At his request, the collection was taken on behalf of the Commonwealth Society for the Deaf, the sum of £33 being realized.

UNIVERSAL GRINDING WHEEL COMPANY, LIMITED, Stafford, has acquired control of the business of Luke & Spencer, Limited, manufacturers of abrasive wheels and grinding machines, Broad Heath, Altrincham. The firm will continue as a separate entity and offer the same range of abrasive products.

INDIA'S FIRST ESCALATOR is expected to be installed at Delhi main station later this year. Designed entirely by Indian railway engineers, fabrication work on the escalator is in progress at the Northern Railways workshop at Amritsar (Punjab). It will have a carrying capacity of 8,000 people per hour.

THE INSTITUTE OF FUEL announces a spring meeting and conference on "Waste Heat Recovery from Industrial Furnaces," to be held in Bournemouth from the evening of Monday, May 15 to 4.30 p.m. on Friday, May 19, 1961. Details are available from the Institute at 18, Devonshire Street, Portland Place, W.1.

TWO NEW fabricating plants to produce corrugated aluminium sheet and ancillary rainwater goods have been established by Aluminium, Limited, in Jamaica and Trinidad. A new company incorporated in Jamaica —West Indies Aluminium Products, Limited—will be managed by Sprostons (Jamaica), Limited, an Aluminium subsidiary.

ANOTHER PHASE in the £9,000,000 development plan of the Rhodesian Iron & Steel Company, near Que Que, Southern Rhodesia, has been completed. A £1,250,000 coke-oven and by-product plant has started full production, after being under construction for three years. Coke production is expected to reach 120,000 tons per annum.

A 16 MM. FILM, "Vanwall Victory," made by a Bradford photographer, Mr. C. H. Wood, for Hepworth & Grandage, Limited, engineers, Bradford, has been selected for preservation in the National Film Archive. The film is of the Vanwall team during its successful season in 1957 which culminated in the winning of the British Grand Prix at Aintree.

THE GLASGOW FIRM of P. & W. MacLellan, Limited, have been allocated the work of breaking up the motor tanker Latirus, of 6,476 tons, which has been sold by Shell Tankers, Limited, to the British Iron & Steel Corporation. The vessel will be reduced at the firm's Bo'ness works. The ship was only completed in 1949 and is now a victim of the tanker market slump.

RECORD RUN of 279 accident-free days established in September, 1958, by the steel division metallurgical department of the Steel Company of Wales, Limited, was equalled by the division's new work department in July this year. July was a good month throughout the whole division, only 29 accidents occurring—18 less than in June. The frequency rate for July was 1.09.

THERE HAS BEEN AN EXPANSION of Metal & Thermit Corporation's interests in the minerals field, with acquisition of the resources and facilities of Orefraction Minerals, Inc., a company which supplies granular and dry-milled zircon for the foundry, and other ceramic industries. The address of Metal & Thermit Corporation is 100, Park Avenue, New York City, N.Y., USA.

WAGE-PAYMENT SYSTEMS and how they will be affected by the new Payment of Wages Act, 1960, will be the subject of a talk to be given by Mr. Harry Samuels, barrister-at-law, at a meeting to be held on Monday, September 26, from 2.15 to 5 p.m. at the Industrial Welfare Society, 48, Bryanston Square, London, W.1. The lecture will be followed by a discussion of the Act and on recent developments in factory law.

DURING the first five monthts of the year, Italian exports to the UK increased by 40 per cent. to £40,200,000. Italian imports from Britain also increased, but less markedly, to £37,500,000. The major increase in exports to this country was partly due to much larger supplies of motor scooters and motor cycles, rolled steel, machinery, petrol, and rubber products. British car exports to Italy rose by 300 per cent. to 2,000, while sales of tractors increased from 1,493 to 1,844.

GENERAL MOTORS-HOLDENS, Australia, expects to treble exports of motor vehicles this year. More than 6,000 Holden vehicles have already been exported this year and the figure is expected to reach 12,000 by the end of 1960, earning for Australia £A6,000,000 in foreign exchange. Last year the company exported 3,400 vehicles. The latest of the 35 overseas markets in which the cars are now selling, is the American island state of Hawaii, where the first shipment will arrive later this month.

A EUROPEAN SYMPOSIUM on "Corrosion Inhibitors" is to be held from September 28 to October 1 at Ferrara, Italy. It is being organized by the Corrosion Study Centre "Aldo Dacco" of the Ferrara University. Attendance is limited to 120 and the list was closed on July 1, but the *Proceedings* are to be made available at a cost of 4,000 liras. This book will carry, in the original language, the text of the 38 papers presented. It is obtainable from Prof. Liliana Felloni,

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News in Brief

c/o Instituto Chemico Universita, Via Scandinavia 25, Ferrara, Italy.

MR. WALTER NURNBERG, the British industrial photographer, is to stage a "one man" show of his pictures of British industry in action as part of the exhibition of the world's best photographs to be held in Cologne from September 24. The exhibition is linked with Photokina, the International Trade Fair for the camera industry, which was started as a shop window for the German industry after the war and has developed into the world's largest exhibition of this type, covering 1,000,000 sq. ft., with 600 exhibits and attracting a quarter of a million visitors.

BRIGHTSIDE HEATING & ENGINEERING COMPANY, LIMITED, Sheffield, entertained over 20 members of the North Western section of the Institute of Fuel on September 7 when they visited the associate company, Brightside Foundry & Engineering Company, Limited. The visitors toured the new ingot-mould foundry, where some general castings are also made, and the engineering plant. They saw parts made for a big distillation unit for converting sea water into drinking water. Mr. W. S. Richards, managing director of the Brightside Heating && Engineering Company, presided at a luncheon before the tour.

ALLIED IRONFOUNDERS, LIMITED, 28, Brook Street, London, W.1, has acquired J. S. & F. Folkard, Limited, of Mill Hill, London, N.7, producers of plumbing equipment in plastics and brass. (The builders' merchants section of Folkard's it not affected.) Allied Ironfounders already has on order plant for the group's developments in the plastics field, and it is stated the products of the newly-acquired company will be complementary to those for which manufacture is already planned. Allied Ironfounders will continue to have the advice and experience of Mr. F. J. Folkard, chairman and managing director of J. S. & F. Folkard, and his other directors and staff.

MR. P. J. C. BOVILL, Master Cutler and managing director of Newton Chambers, Limited, Chapeltown, Sheffield, and Mrs. Bovill, Mistress Cutler, presented bonus awards to apprentices and girl students employed by the company on September 8. £147 was presented to 100 apprentices, and £63 to 34 girls. Last year £125 was presented to girls and £159 the year before. It was announced that Mr. Roy Chambers, had gained the higher national diploma in mechanical engineering. Mr. David Haywood had completed with success a foundry technology course at Wolverhampton. The winner of the Palmer Cup in apprentices' shop awards was Mr. Michael Hellewell, 21-year-old fitter; his twin, Keith, a welder, was joint runner-up with Mr. Martin Macleod.

THE MINIATURE Ravenglass and Eskdale Railway—"La'al Ratty"—was sold by auction on September 7 for £12,000 to the newly-formed Ravenglass and Eskdale Railway Preservation Society. The Society is led by Mr. Douglas Robinson, a Bradford engineer employed at Windscale, who is also Clerk to Muncaster Parish Council. The deal covered 7¼ miles of 15-in. gauge railway track, two model steam locomotives, a diesel engine, 35 open coaches, two rail tractors, an engine chassis, a weed-killing bogey, four saloons, a cafe, 10 cottages and several pieces of freehold land. The railway was opened in 1875 for transporting ore from a mineral mine and has been a tourist attraction for passengers in recent years. It was owned by the Keswick Granite Company.

Recent Wills

SMITH, H. G., chairman of George Hattersley Sons, Limited, manufacturers of textile and weaving machinery, of Keighley (Yorks), and a director of the company for nearly 50 years. £78,821

MATTHEWS, DAVID, founder of the firm of David Matthews, Limited, iron, steel, metal, and tinplate merchants, of Swansea, twice Mayor of Swansea, and, for a short period, M.P. for Swansea East £28,222

TURNER, S. B., managing director of Pickford, Holland & Company, Limited, makers of refractories, of Sheffield, and a leading member of a number of associations in the field of refractories and ceramics £13,627

TINLEY, E. L., technical director for many years of Joshua Bigwood & Son, Limited, Wolverhampton engineers, a director of Butro Jig & Engineering Company, Limited, and other companies, and a member of the council of the Combustion Engineering Association £22,694

WOLSTENHOLME, JOHN, president of the Walmsley (Bury) Group, Limited, manufacturers of pulp and paper making machinery, director of all the companies in the group and a former chairman of of the company £370,680

SMYTH, S. C., formerly managing director of S. Calton Smith, Limited, Dunstable, now a subsidiary of C. E. Johansson, Limited, precision engineers, and a former director of the Adamant Engineering Company, Luton £21,180

TURNER, REGINALD, founder and head of Turner Automatic Machinery Company, Limited, engineers, of Bradford £36,972

LEWIS, GROUP CAPT. E. C., a director of Hick, Hargreaves & Company, Limited, engineers, ironfounders, and millwrights, of Bolton (Lancs) £100,965

FINDLAY, JOHN, chairman of the Premier Lamp & Engineering Company, Limited, Leeds, managing director of Barnes & Bell, Limited, Glasgow, iron, steel, and machinery merchants, and chairman of the Steel Stockholders' Association £46,570

Board Changes

LEYLAND MOTORS, LIMITED—Mr. W. E. Pearson has resigned from the board.

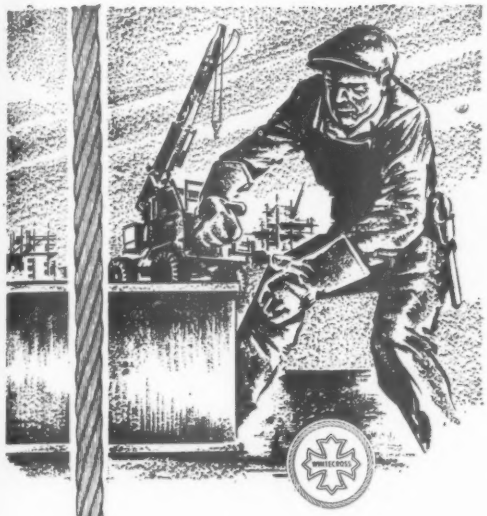
ROYSTON INDUSTRIES, LIMITED—Lt-Cmdr. J. M. A. Parker (retd.) has joined the board.

LIGHTFOOT REFRIGERATION COMPANY, LIMITED—Sir Percy Sanders has resigned from the board.

Law Case

An action brought in the Court of Session against the Carron Company, ironfounders, etc., by an Edinburgh woman who claimed that she was entitled to a vote in the direction and management of the company's affairs has been dismissed by Lord Walker. The action was by Mrs. Dorothy Barron Pentland Forwell or Brown, widow of Charles Marshall Brown, who, at the time of his death in 1948, was secretary of the company and a voting partner. In terms of his will, Mrs. Brown inherited his whole estate, including his 17 shares each valued at £250 in Carron Company, her shareholding thus becoming the largest held by anyone in the company as an individual.

BY an agreement with Thomson, Shepherd & Company, Limited, Dundee, the Bristol Tool & Gauge Company, Limited, has disposed to the Dundee company of its holding in Bristol Tool & Gauge (Scotland), Limited, and the name of that company has been changed to Seafield Tool & Gauge Company, Limited. The board of the new company comprises Mr. C. R. G. Macfarlane, Mr. Alastair Sutherland, and Mr. George B. Halley, together with Mr. T. W. Sands, who has been general manager of the company since its inception. Mr. W. E. Slingsby continues as secretary of the company.



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WARRINGTON ENGLAND
EST: 1864

Pressure Die-casters never say die!

Never say die when it comes to casting,
DIE SLICK'S a trick that's everlasting.
Here's a slick will make you master,
Casting cleaner, slicker, faster.

When you're in deep water friend,
And you feel this is the end.
When your cherished castings fail,
Holler for the DIE SLICK pail.

Foremen know its famous touch,
Just a dab or two, not much
Will transform a scene so tragic
Successfully, as though by magic.

For aluminium, brass or zinc,
DIE SLICK is the missing link.
A choice of grades all made to measure,
Casting then becomes a pleasure.

Never say die when it comes to casting,
DIE SLICK'S a trick that's everlasting.

W. J. HOOKER LTD

239a FINCHLEY ROAD, LONDON, NW3
Telephone: Swiss Cottage 3281-2-3-4.

Raw Material Markets

Iron and Steel

There are plentiful supplies of raw materials available, apart maybe from some special qualities of scrap and ironfoundries have adequate tonnages at their disposal. Outputs of pig-iron in all grades are more than sufficient to satisfy present demand and extra tonnages are available should these be found necessary. Production of basic pig-iron is maintained at high levels and in sufficient quantities to meet the requirements of the steelworks, which are relying on these supplies while supplies of scrap remain scarce. Increased imports of scrap have relieved the position to some extent recently.

The engineering and speciality foundries continue to use substantial tonnages of low phosphorus irons, together with appreciable quantities of hematite and some refined irons. The pressure for supplies in some quarters is not so insistent as it has been, but whether this is due to a falling off in trade or the desire to reduce stocks on hand remains to be seen.

The drop in motor car export sales appears to be slowing down production at some of the foundries, but overall there is little evidence of a general decline in the call for castings from the motor vehicle trade. Other consumers of high quality castings including heavy electrical and power plant manufacturers, machine-tool makers, and the heavy engineering industries, continue to specify substantial tonnages and these keep the foundries catering for them employed at good levels.

Makers of high phosphorus irons would welcome much increased demands than are at present forthcoming. The light foundries supplying castings to the building trades are fairly busy, as well as the foundries catering for the textile industry. The jobbing foundries continue fairly well employed, but the demand for light castings from the domestic utensil trade remains moderate. Consignments of high phosphorus irons continue to be shipped abroad and more is available as orders can be obtained. Foundry coke, ganister, limestone, and firebricks are all in good supply.

The re-rollers continue well occupied and there is no slackening in the call for small bars, light sections, and reinforcing rods, although the scarcity of suitable labour is restricting outputs, which are lower than the work in hand warrants.

Plentiful supplies of mild steel billets are held by most of the re-rollers and additional supplies are available from home steelworks when required. The re-rollers requiring carbon and special quality steels are not so well provided.

Non-ferrous Metals

The copper market in London is quietly steady. Demand is relatively good and, for the first time in 10 weeks, stocks dropped at the end of last week and now stand at a total of 8,024 tons. However, it is reported that part of the support for the market has come from the producers. If so, it will only be of a temporary nature and suggests that cut-backs may be reintroduced if the market does not improve.

The outlook is still clouded by the situation in the Congo and there is, too, the question of a strike at Chuquicamata in Chile at the end of this month. Until these two issues are settled the market will tend to drift.

In the United States the market for copper continues slow and most observers are looking for a change in the price structure. Indeed, the Belgians have reduced their price by ½ cent per pound to the equivalent of 29½ cents a pound. At the moment, US copper for export is available at 31¼ cents and copper is being offered on the domestic market at around 31½ cents a pound, which compares with the official custom smelters' and producers' price of 33 cents a pound.

Tin has been a steady market in London, an improving market in the East, and erratic in New York where the quotation is something less than $1.03 cents a pound. At the beginning of this week the London price jumped by over £6 a ton to £810 a ton leaving a backwardation of about £5 a ton thereby indicating a squeeze on nearby supplies, which seems reasonable following the fulfilment of recent Continental orders. Tin stocks in LME warehouses at the end of last week totalled 9,161 tons, a drop on the week of 43 tons.

Zinc is a better market in London than in New York where demand has been disappointing and prospects are not particularly encouraging for an improvement in the months to come. The US price is unchanged at 13 cents a pound. The metal is under the general influence of the International Lead and Zinc Study Group meeting in Geneva. There are those who feel that the Study Group will recommend a cutback in production and this may well prompt some consumer interest in front of the official communiqué.

The Study Group is also having its influence on lead and this market is quiet on both sides of the Atlantic. The Study Group may well recommend some form of restriction on production or supplies to ease the present world surpluses. The US price is unaltered at 12 cents a pound.

IBF Slough Section to visit Broom & Wade

A works visit to the works of Broom & Wade, Limited, manufacturers of compressed-air equipment, pneumatic hoists, etc., has been arranged for the Slough section of the Institute of British Foundrymen on Tuesday, October 11, commencing at 2 p.m. The foundry at High Wycombe is an up-to-date mechanized plant producing high-quality castings of up to approximately two tons in weight, at the rate of about 2,500 tons per annum in high-duty low-phosphorus cast irons to grades 14 and 17. The visit will last approximately four hours, and at its conclusion light refreshments will be available for the visitors by kind invitation of the company. An evening meeting will also be held at the Broom & Wade works, when Mr. G. L. Harrison (Mond Nickel Company, Limited) will lecture on "Production and Use of Spheroidal-graphite Iron." To facilitate arrangements, members of the section who have not already made application to attend are requested to do so immediately. If participants are unable to make their own travel arrangements, coach transport will be provided.

Recent Orders

ADMIRALTY and Ministry of Aviation have ordered oscilloscopes, worth £250,000, from Solartron Laboratory Instruments, Limited, a subsidiary of the Solartron Electronic Group, Limited, Farnborough.

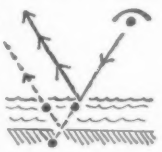
ORDER FOR 24 industrial trucks, worth £65,000 has been placed with Lansing Bagnall, Limited, materials handling equipment manufacturers, of Basingstoke, by Standard-Triumph International, Limited. The vehicles include 22 electric-powered reach trucks, each of two-ton capacity, and two towing tractors for tractor/trailer operations.

Electrical Aids in Industry *Data Sheet* **No. 13**

Infra-Red Heating

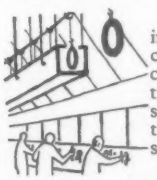
Infra-red heating is the name given to the method of using in industrial processes radiant heat from heaters specifically designed for that purpose. This differentiates it from methods employing both radiation and convection, as in furnaces, although the effect of the radiation is much the same in both cases.

Radiant heat provides a higher rate of heat transfer to bodies not highly reflective than does convection, unless high-velocity forced convection is used. The rate of heating of a body depends on the intensity of radiation on its surface, the proportion absorbed by the surface and, after that, on heat conduction. In heating very thin bodies, for example paint films, the radiation not reflected nor absorbed passes through and is in turn reflected or absorbed by the underlying material. This reflected heat is partly absorbed by the paint film "on the way back". Despite this effect infra-red gives mainly a surface heating effect except in the case of a few special applications.



Infra-red heaters mainly use metal-sheathed elements in special reflectors, but infra-red lamps with internal reflectors are still used in special cases. Other types use silica-sheathed elements or quartz-sheathed lamps in reflectors. A wide range of heaters is available with simple mounting arrangements to enable heat to be applied quickly and effectively either in a production line or in some odd corner.

Control of the charge temperature is effected by regulating the heating time and power. In the case of a moving charge, this is done by adjusting the conveyor speed and the number of heaters in circuit, i.e. by adjusting the effective length of the oven. Some of the heaters may be controlled by energy regulators or adjustable transformers.



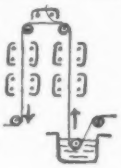
The advantages of infra-red heating over convection heating include reduced heating times, reduced floor space, lower installation costs, almost instant starting, ability to focus the heat, and flexibility in effective oven length. Infra-red ovens can often be mounted in the roof, saving valuable floor space. Infra-red heating is not generally favourable for heating large bodies of low heat conductivity.

Paint Stoving

Many paints, particularly synthetic enamels, and including synthetic wood finishes, are well suited to infra-red heating, and many products ranging from small components to complete motor cars are being successfully stoved. Infra-red heating reduces stoving times very considerably and often improves the finish.

Moisture Extraction

Infra-red can provide high drying rates, either of liquid surface films or of thin absorbent materials. Sheathed element heaters usually give the highest rates, but lamps are sometimes used where the dried material is particularly heat-sensitive. Applications include such tasks as drying of paper and textile products, bottle seals and labels, clayware glazes and many others.



Plastics

Infra-red is widely used in the plastics and allied industries for such typical applications as softening and curing of plastic sheets and belts, heat setting of nylon and similar fabrics, drying and curing of plastic and rubber coatings and others where a plastic forms the whole or part of a product.

The above are just a few examples of successful applications of infra-red. In many other processes infra-red heaters can often be fitted quickly and cheaply, to save time, labour and floor space and, therefore, money.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on electricity and productivity (8/6 each, or 9/- post free) are available—"Resistance Heating" is an example; "Induction and Dielectric Heating" is another.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity. Ask for a catalogue.

8131-4

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

September 14, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6d. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £43 10s. 0d. to £46 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £59 0s. 0d. to £63 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr. scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—BASIC: soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plate (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast), £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast), £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 17s. 0d.; nickel-chrome, £98 11s. 0d.; nickel-chrome-molybdenum, £111 4s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £235 5s. 0d. to £235 10s. 0d.; three months, £235 15s. 0d. to £236 0s. 0d.; settlement, £235 10s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 3⅝d. per lb.; rods, 250s. 0d. per cwt. basis; 20 s.w.g., 285s. 0d. per cwt.

Tin.—Cash, £810 0s. 0d. to £811 0s. 0d.; three months, £805 0s. 0d. to £806 0s. 0d.; settlement, £811 0s. 0d.

Lead (Refined Pig).—First half September, £70 17s. 6d. to £71 0s. 0d.; first half December, £71 0s. 0d. to £71 2s. 6d.

Zinc.—First half September, £88 0s. 0d. to £88 15s. 0d.; first half December, £87 15s. 0d. to £88 0s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £124 0s. 0d.; rolled zinc (boiler plates), all English destinations, £121 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £100 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10⅞d. per lb.; sheets to 10 w.g., 206s. 0d. per cwt.; wire, 2s. 8½d.; rolled metal, 206s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £171; B6, £220.

Brass (High Tensile).—BS1400, HTB1, £196; HTB2, £212; HTB3, £230.

Gunmetal.—BS1400, LG2, £215; LG3, £225; G1, 1½%, £284; G1, 1%, £272.

Phosphor Bronze.—BS1400, PB1 (AID released), £309; BS1400, 90/10/1, £297.

Leaded Phosphor Bronze.—BS1400, LPB1, £236.

Phosphor Bronze Strip, etc.—Strip, 293s. 3d. per cwt.; wire, 4s. 1⅞d. per lb.; rods, 3s. 4¼d.; tubes, 3s. 4¼d.; chill cast bars, solids 3s. 3¾d.; cored 3s. 4¾d (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11¼d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4¼d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £200 0s. 0d. Quicksilver, ex-warehouse, £69 10s. 0d. to £70 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £250, AB2, £259.

* Average 68-70 per cent.

Factory Equipment Exhibition

The International Factory Equipment Exhibition is to be held in Belle Vue, Manchester, from September 21 to October 1, and some of the stands which will be of particular interest to founders are described briefly below:—

COLT VENTILATION, LIMITED (*Stand D.46*). A particular feature of this company's exhibit is the design of the stand which will enable inspection of the equipment from both above and below roof-level. New items of equipment to be shown include the model O/SR ventilator, which by a simple cord or chain control can be opened wide to the sky: the low-silhouette unit, a mechanical extracting ventilator, a two-way fan for use in dark-rooms; and turbo-static oil-fired air-heaters.

KEITH BLACKMAN, LIMITED (*Stand D.38*). This display falls into two groups, dust- and fume-control equipment and fans, blowers and allied equipment and industrial gas-equipment. Of the six exhibits in the former section two being shown for the first time are the Tornado-Fischer automatic self-cleaning filter, and the Tornado-Solivore wet scrubber, designed for collecting dust and fume particles as small as 0.1 micron dia. In the second section will be displayed a new steam-heated "heat throw" unit-heater; centrifugal-type fans, a bifurcated fan for exhausting fumes and gases up to 350 deg. F.; and a fume exhausting unit. The industrial gas equipment display will include apparatus for low-and high-pressure and air-blast systems.

DALLOW LAMBERT, LIMITED (*Stand E.8*). Demonstrations of sludge-removal methods by wet "dedusters" will be given by this company as part of their display of dust-control equipment. Unimaster dust-control units will be showing how a filter can meet the steady increase in dust problems associated with pneumatic conveying systems.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED (*Stand D.68*). Heating and welding equipment will be shown by this company. The former type of exhibit will comprise a display of industrial heating elements, showing the wide range of applications for tubular-sheathed elements; infra-red projector units, and a number of space-heaters.

Italian Machine-tool Exhibition

The Italian Biennial Machine Tool Exhibition has been organized by the Italian Machine Tool Makers' Association, Via Palestro 22, Milan, to take place in the Milan Fair zone from October 7 to 16. Visitors to the Exhibition will find that a special fare reduction will be granted to them for the railway journey within Italy, and for admittance it will be necessary only to show their passports. Every effort is being made to confine the exhibition to the trade.

Exhibits of die-casting machines will include that of A. Triulzi, of Milan, who will have on display a selection of cold-chamber and hot-chamber models from their Castamatic range; hydraulic presses, and castings made from their various machines.

Mr. J. B. HAMILTON-MEIKLE has resigned from the board of Henry Balfour & Company, Limited, in order to devote more time to his own business.

PIG IRON, All Grades
METALLIC ABRASIVES
SHOTBLASTING MACHINERY
FOUNDRY MACHINERY

WILLIAM
JACKS
AND COMPANY LIMITED

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WINCHESTER HOUSE
OLD BROAD STREET
LONDON EC2.
LONdon Wall 4774

And at:
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39 Corporation Street,
Midland 3375/6

GLASGOW C2
93 Hope Street,
Central 9969

FERRO SILICON 12/14%
ALLOYS & BRIQUETTES
FOUNDRY COKE
LIMESTONE
GANISTER
MOULDING SAND
REFRACTORIES

Company News

BILSTON FOUNDRIES, LIMITED—The offer of Allied Ironfounders, Limited, to acquire the company has been accepted by the holders of more than 90 per cent. of the capital and has now been declared unconditional. Further acceptances will be received.

SMITH & WELLSTOOD, LIMITED, ironfounders and makers of cooking and heating appliances, of Bonnybridge (Stirling)—Final dividend of 10 per cent. for the year ended June 30, 1960, makes 12½ (10) per cent. Group net profit rose from £69,310 to £80,996, after tax of £79,117 (£61,351).

EXPERT TOOL & CASE HARDENING COMPANY, LIMITED—Group loss was reduced from £58,221 to £43,567 in 1959. The preference dividend is again passed and is now in arrear from July 1, 1958. After various adjustments the debit forward is £31,633, compared with a previous credit of £10,774.

W. G. ALLEN & SONS (TIPTON), LIMITED—No ordinary dividend is to be paid for the year ended March 31, 1960, against a total of 15 per cent. for the previous year. There was a net loss of £31,670, compared with a net profit of £58,160, after tax credit of £13,340 (tax charge of £47,808).

GIBBONS (DUDLEY), LIMITED—The formal offer of 120s. per ordinary share has now been made by Wellington Tube Holdings, Limited. An offer of 40s. per share is also being made for the 7 per cent. (tax free) £1 preference shares, of which £30,000 have been issued. The directors recommend acceptance of the offers and intend to accept in respect of their own holdings.

BROKEN HILL PROPRIETARY COMPANY, LIMITED—The fixed assets are to be revalued, after which a one-for-two scrip issue is to be made. The dividend next following the issue will be reduced to two thirds of what it otherwise would have been. The issue will be made after the November, 1960, dividend, which will therefore be unaffected. During 1961 it is likely that consideration will be given to further issues of shares for cash.

UNIVERSAL GRINDING WHEEL COMPANY, LIMITED—The recent offer of one of the company's 5s. ordinary shares and 30s. cash for each of the 240,000 issued £1 shares of Luke & Spencer, Limited, has received over 90 per cent. acceptance and declared unconditional. Acceptance date has been extended to September 20. Luke & Spencer manufactures grinding wheels and other abrasive products in competition with the company.

HORSELEY BRIDGE & THOMAS PIGGOTT, LIMITED, constructional and plant engineers, etc., of Tipton (Staffs)—Although the future trend of business remains uncertain, Mr. J. V. Sheffield, the chairman, states that in recent months the order position has improved slightly. An agreement has been entered into with Union Tank Car Company, Limited, for the sale of part of the holding in Mechans, Limited. The foundry at Tipton has been closed, owing to lack or orders, and is now being used as a specialist transmission line tower shop.

ENGLISH ELECTRIC COMPANY, LIMITED—An issue of £7,000,000 6 per cent. debenture stock 1980-85 at £96½ per cent. is to be made to debenture, preference, and ordinary stockholders, registered on August 24. Lord Nelson of Stafford, the chairman, states that apart from normal growth, diversification calls for more capital. The point has now been reached where retained profits are inadequate to meet all capital expenditure and the group bank overdrafts stand at £22,000,000. The new issue will bring the aggregate annual gross debenture interest charge to £1,542,520.

Ruston & Hornsby faces Rising Costs

Earnings in terms of a return on capital employed by Ruston & Hornsby, Limited, engineers, oil- and gas-engine manufacturers, boilermakers, etc., of Lincoln, continue to disappoint, states Mr. W. J. Ruston, the chairman. It stems, he says, not only from narrow profit margins on sales but also from under-employment of capacity. The latter is a matter with which the company is actively concerned both by stimulating additional production of existing products and by using excess capacity from obsolete lines on new products.

Compared with 1959 there had been an increase in output, but it had not been spread evenly throughout the organization. Some very interesting business had been secured from abroad for engines, locomotives, and turbines, Mr. Ruston said. Some of these contracts involved extended credit terms. The company needed to expand its overseas outlets and with regard to exports Mr. Ruston thought that more Government backing was needed in British industry.

Group profit for the year ended March 31, 1960, was £986,935, a rise of £5,990 on the previous year. Dividend is restored to 9 (8) per cent.

Elliott-Automation Link with US Valve Manufacturers

Manufacture and sale of certain valves, notably the P-K Paul Valve, is to be undertaken by Elliott Bros. (London), Limited, a member of the Elliott-Automation, Limited, group, under licence from General Kinetics Corporation, of New Jersey, US. The licence covers only areas in the Eastern hemisphere. At the same time, General Kinetics has entered into a separate agreement with Elliott which gives the US company exclusive rights of distribution and servicing of certain of Elliott's equipment throughout the Western hemisphere.

The main bulk of equipment from the Elliott group will come from James Gordon Valves, Limited, and the group's comparatively new acquisition, Black Automatic Controls, Limited. The main reason for the arrangement is to give Black Automatic an outlet to the US market. The company manufactures a variety of control valves and pressure regulating equipment.

Fletcher Houston Acquisition

All the £14,750 issued capital of Harringtons (Engineers), Limited, of Kingswinford (Staffs), a private company trading as general engineers, has been acquired for £5,000 by Fletcher Houston & Company, Limited, founders of high-duty-alloy and grey-iron castings, of Tipton (Staffs). Harringtons, it is stated, made a heavy loss last year owing to exceptional circumstances.

At April 30 last, the assets at book value exceeded the liabilities by £2,388, although the directors are satisfied that the value of the assets is in excess of the book figure as they consider the freehold premises and plant to be worth considerably more than their book valuation. It also appears from preliminary figures available to July 31 that the losses have been arrested, and the assets acquired should therefore be of considerable value to the group.

Baker Perkins Foundry Machinery at work... *at the Southend Engineering Co. Ltd.*

This Baker Perkins Girojet Universal Shot Blasting Machine operates without compressed air, needs negligible maintenance and costs little to run. And here's another advantage—no foundations are needed. The Girojet will take an evenly distributed load of 500 lbs. Average shotblasting times: aluminium (2-4 minutes); grey iron (3-6 minutes); malleable cast iron or bronze (4.5-8 minutes); forged steel or stamped steel (10-20 minutes).

This is the machine that completely replaces the hand cabinet.

Please write for full details today.

Baker Perkins Ltd. ENGINEERS

Bedewell Division, Hebburn-on-Tyne, Co. Durham
Telephone: Jarrow 897124

HISTORICAL NOTE

Southend Engineering Company was established in 1901, and manufactured Marine and Stationary engines until 1914. The Firm has produced its own non-ferrous castings since 1938. They manufacture the "Viking 3" Outboard Motor, a set of flame guns for agricultural purposes, and a range of Stern Gear and fittings for marine engine manufacturers.

BP/F10

New Catalogues

Heat-treatment Furnaces. In Publication No. R33, the Electric Resistance Furnace Company, Limited, Netherby, Queens Road, Weybridge, Surrey, illustrate and describe a wide range of heat-treatment furnaces. Most branches of the foundry industry use some type of heat-treatment furnaces; they are essential in the malleable trade, and almost so, too, for steel and light-alloy castings manufacture. Indeed, their use is rapidly extending to founders of grey iron. Many of the dozens of the annotated illustrations in this booklet are of equipment suitable for foundry applications.

Lifts, Hoists and Magnetic Separators. Under leaflet No. L.H.101, Herbert G. Richardson & Company, Beehive Works, Walsall, illustrate 14 types of lifts and hoists of which quite a number are drawn from foundry applications. In another publication, No. M.S.101, issued by the company, is covered a wide range of magnetic separators made for use in many industries, including the iron and non-ferrous industries.

Vacuum Furnaces. Publications E46 and E47, from the General Electric Company, Limited, Erith, Kent, deal with vacuum-induction and vacuum-resistor furnaces. The range of the former is from 1 lb. to one ton to include a dozen models of varying diameters having nine capacities for metal-melting purposes. The resistor furnaces are designed for sintering, brazing, melting and heat-treatment and of these there are no fewer than 13 sizes listed.

Centrifugal Pumps. In recent literature, Arthur Lyon and Company (Engineers), Limited, 6, Carlos Place, Grosvenor Square, London, W.1, illustrate and describe the Alcon Thames range of single-stage centrifugal pumps, which are available in five sizes. A clear annotated line-drawing shows the design (including details of the mechanical seal assembly), whilst a graph sets out the performances attained by these units.

Welding. An interesting booklet has been received from Eutectic Welding Alloys Company, Limited, North Feltham Trading Estate, Feltham, Middlesex, entitled "Maintenance Welding Data Book." Five pages are devoted to the welding of cast iron by electric methods. It includes a number of clear descriptions of worth-while tips.

Radiant-Jet Furnaces. Under reference No. V 61, Incandescent Heat Company, Limited, Smethwick, describe and illustrate a batch furnace using Jetube radiant-heat elements. It operates between 700 to 1,000 deg. C., and is available in two sizes 36 by 24 by 12 in. and 48 by 36 by 18 in.

House Organ

Wiggin Nickel Alloys No. 57. Published by Henry Wiggin & Company, Limited, Thames House, Millbank, London, S.W.1.

This issue describes and illustrates gas-carburizing furnaces using Incoloy DS, a nickel-chromium-iron alloy, for the retort containing the carbon-rich atmosphere. Other articles include, the use of Nimonic 90 heat-resisting alloy in the "hot-zone" of a high-temperature extensometer built for the R.A.E.; mechanical seals for pumps and other equipment used in the chemical industry in Monel corrosion-resistant alloys; details of research work which has gone into improved alloys for spark-plug electrodes, and descriptions of many types of solenoid valves using Nilo 48 controlled-expansion alloy for the magnetic components.

Publications Received

Industri Information No. 10. Issued by Fesil-Brikettfabrikken Y/S, Porsgrunn, Norway.

This issue, which is printed in English and German, carries an article by Mr. J. H. Williams, B.SC., on "Silicon Briquettes for use in Cast-iron Founding." The author has the gift of lucid expression and he is obviously writing for the modern foundry foreman who has an elementary knowledge of metallurgy, but is practical. Thus, when setting out the claims for the use of silicon briquettes, the statement is devoid of exaggeration and gives facts in terms readily appreciated by his readers. This interesting brochure is obtainable from F. & M. Supplies, Limited, 4, Broad Street Place, London, E.C.2.

Stermet Data (Second edition), published by Sterling Metals, Limited, Gipsy Lane, Nuneaton.

This collection of data-sheets covering light alloys and cast iron is most useful to purchasing agents and designers. The light-alloy range includes all the standard aluminium alloys and five groups of magnesium-base alloys. A section is devoted to precision-moulded castings in both aluminium and magnesium alloys. The final subject, cast iron, is restricted to consideration of cylinder-blocks and heads in which the firm specialises. The brochure is spirally bound, well printed, and does credit to the foundry industry as an excellent example of business literature.

Witton-Kramer Electric Lifting Magnets. Issued by the General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2, as Technical Publication No. 379.

The first Witton-Kramer electric magnet made its appearance over 50 years ago and soon became established as a convenient method of handling steel components. Starting from the standard circular model, many variations have been devised for special applications and amongst these is a magnet for the interesting application of charging rotary furnaces in which the temperatures reach 1,000 deg. C. where water-cooling of the magnet is adopted.

Some Facts and Figures. Published by the David Brown Organization, Huddersfield.

In this *multum in parvo* brochure, by intensive compression a quite complete story has been presented of the scope of the Organization's activities including the sale of multifarious engineering products.

Book Review

Atomic Theory for Students of Metallurgy, by William Hume-Rothery, O.B.E., F.R.S. Published by the Institute of Metals, 17, Belgrave Square, London, S.W.1; price 50s.

This is a completely revised and considerably enlarged edition of the monograph "Atomic Theory for Students of Metallurgy," which first appeared in 1946 and has since been reprinted several times. In the first edition is given a general background to the electron theory of metals—an understanding of which is essential to the metallurgist to-day—and the book treats the subject specifically for the metallurgical student. In the new edition many of the chapters have been completely rewritten to take account of the rapid increases in knowledge that have occurred in the last few years.

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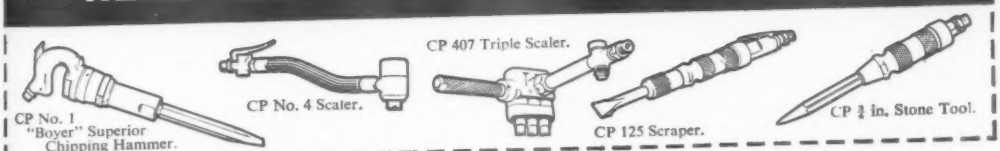

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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

YOUNG MAN, 30, well educated, City and Guilds Foundry practice and Diploma National Foundry College, executive, laboratory and sales experience, seeks interesting position in the foundry or allied industries in the London area. Prospects more important than starting salary. Box YM803, FOUNDRY TRADE JOURNAL.

FOUNDRYMAN, 35, B.Sc., A.M.I.B.F., looking for a new post. Knowledge and experience of iron, steel and non-ferrous founding. Would consider technical, supervision, management or representation. Prospects as important as initial salary. Box FO814, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT/METALLURGIST (42), returning to U.K. from South Africa, towards end of October seeks position in either Grey Iron and/or Malleable Foundry as Foundry Technician or Metallurgist. All replies will be acknowledged. Box FS824, FOUNDRY TRADE JOURNAL.

LATE FOUNDER and works director of Non-ferrous Foundry seeks managerial or foreman's position. Practical experience all aspects of the trade, moulding, core making, fettling, metal control, etc. Aged 49. Willing to train younger person. H. E. S. SEYMOUR, 2, Edward Avenue, Chaddesden, Derby.

PRACTICAL Foundry Manager/Superintendent. Whiteheart, Blackheart, Grey. Fourteen years executive, jobbing, mechanisation, capable full control. Seeks post Wolverhampton area. Box PF818, FOUNDRY TRADE JOURNAL.

FOREMAN PATTERNMAKER, A.M.I.B.F., age 38 years, requires position as representative in Pattern or Foundry Supplies, etc. Wide experience in both trades. Any area. Box FP817, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, 45, seeks change, preferably in Scotland. Wide experience in copper base and light alloys, modern foundry practice and technique. Position as representative considered. Box FM819, FOUNDRY TRADE JOURNAL.

TECHNICAL ENGINEER wishes to represent a Foundry for Grey Iron, Aluminium and Non-ferrous Metals Diecastings in Aluminium, Mazak Lead, and Tin Alloys, etc. First-class connection with works in London and Home Counties. Part expenses and commission. Box TE821, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

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FOUNDRY METALLURGIST required for Ferrous Foundry (mechanised) situated in East Anglia. Cupola control essential and must have practical experience in sand control. Send details of experience, age and salary to Box FM806, FOUNDRY TRADE JOURNAL.

SENIOR FOUNDRY ESTIMATOR required, capable of calculating casting weights and production costs and organising estimating department. Please reply stating age, experience and salary required to Box SF813, FOUNDRY TRADE JOURNAL.

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SMALL IRON FOUNDRY, Staffordshire, producing high duty castings by sand and shell moulding process, require FOUNDRY MANAGER. Must be fully experienced. Excellent prospects. Please give full particulars, including salary expected, to Box SM825, FOUNDRY TRADE JOURNAL.

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THE PROPRIETORS of Patent No. 752673 for "Improvements in or relating to a Process and Apparatus for Desulphurising Pig Iron" desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

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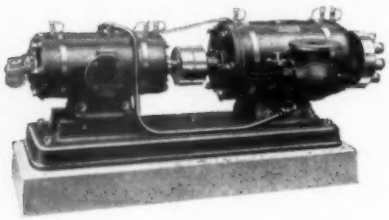

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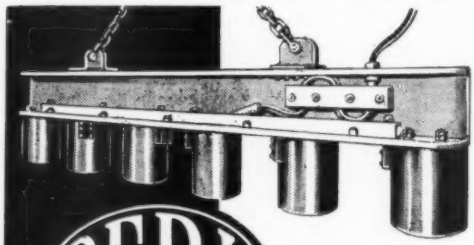

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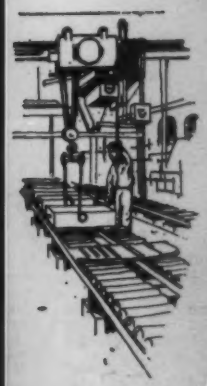

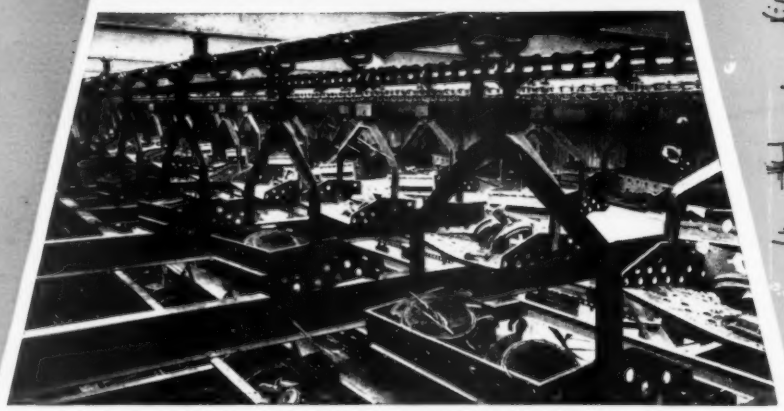

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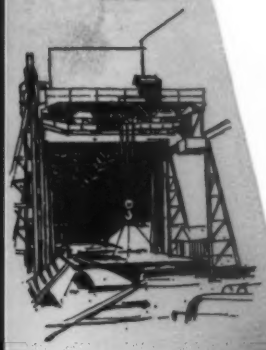

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